NAVAL AVIATION NEWS

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STRIKE TESTED

Pushing the Envelope with VX-23

WHAT'S INSIDE

Marines stage three CH-53E Super Stallion helicopters while deployed for training in Brunswick, Maine, July 17.

U.S. Marine Corps photo by Cpl. Micha Pierce

NAVAL AVIATION NEWS

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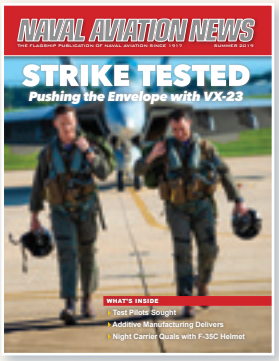

On the cover: *Air Test and Evaluation Squadron (VX) 23 test pilot Lt. Sean "Crush" Delaney and weapon systems officer Lt. T.C. "Brick" Barth return from weapons separation flight testing conducted in July at Naval Air Station (NAS) Patuxent River, Maryland. (U.S. Navy photo by Adam Skoczylas)*

In this issue, VX-23 updates the fleet on flight tests performed during 2019 in a special section starting on page 39. On page 4, Cmdr. Glenn Rioux, U.S. Naval Test Pilot School Commanding Officer, outlines what it takes to qualify for test pilot school. The Naval Aviation Enterprise continues to focus on readiness with the implementation of the Military Depot-Level Certification program and its first certified Sailor, Aviation Mechanic 1st Class Michael Hammer at NAS Lemoore (page 16). The Naval Air System Command's additive manufacturing team continues to deliver affordable parts to the fleet in record time (page 32).

On the back cover: *Aviation Boatswain's Mate (Handling) 3rd Class Marricco Roberts directs aviators during a vertical replenishment-at-sea aboard aircraft carrier USS Carl Vinson (CVN 70). (U.S. Navy photo by MC2 Sean M. Castellano)*

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Flightline

Looking for a Few Good Test Pilots

Editor's note: The following is an expanded version of a recent Naval Air Systems Command (NAVAIR) podcast with Cmdr. Glenn Rioux, Commanding Officer, U.S. Naval Test Pilot School (USNTPS). In the question and answer feature below, Rioux explains what it takes to be a test pilot and how to apply to USNTPS.

USNTPS in Patuxent River, Maryland, has always played an integral role in Naval Aviation. Why is it so important?

We are here to educate the world's finest test pilots, flight officers and flight test engineers. We do that by bridging the tactical to the technical and bringing the mission relation side of the tactical operator into the acquisition process. The test pilot school is important because we ensure that the folks who are designing and producing the equipment we need understand the mission impact and design the equipment accordingly. We have a rich heritage at test pilot school and a culture that fosters our large team of smart, professional, motivated people who are all heading in the same direction—it's a great place to be.

What makes a good test pilot?

A good test pilot knows their platform and mission and is able to draw from a highly technical foundation to design, execute and communicate aviation test events, while implementing appropriate risk mitigation and buildup to take a potentially dangerous event in uncharted territory and make it appear to be routine. In short, test pilots have a special combination of gut feeling and technical knowhow that enables them to bring the tactical impact to the acquisition process.

What separates a test pilot from other naval aviators?

Grit. Perseverance. Self-sacrifice. Vision. There is definitely an element of attitude, counterbalanced by a heaping of humility.

Who can apply, and what qualifications are required?

First, we look for sustained superior performance. Selectees have consistently been officers who are ranked No. 1 or sometimes No. 2 on their high water competitive fit rep.

Second, the board selects the pack-plus-players, meaning, we look for those aviators who achieved the extra qualifications. While community specific, they include advanced mission or instructor qualifications or key junior officer ground jobs that the officer community values.

The third thing is timing. Without a competitive high water fit rep from the first sea tour, an aviator's career will not progress. That needs to happen before the officer checks out of their command, and it defines the left side of that timing

The U.S. Naval Test Pilot School's lineup outside the hangar in Patuxent River, Md. The school is home to both the Navy's newest and oldest fixed-wing aircraft flying five different type/model/series, four rotary-wing and four airborne and unmanned systems.

window. On the right side, unrestricted line officers need to be in their department head tour by year group plus 11. That means that an officer in year group 10, as in the year 2010, needs to be in their department head tour no later than October 2021. In between, there are about 18 months of test pilot training, and then a minimum of a two-year test squadron tour—but we prefer three. Academic performance is also a consideration in the selection process, but if a candidate doesn't meet the first three criteria, then grades don't matter.

How competitive is the admissions process?

The admissions process is extremely competitive. Usually the No. 1 and No. 2 ranked officers are the ones who are selected, and it is based off a demand signal from our test squadrons that know two years in advance who is going to be leaving. For example, say we will be testing the Advanced Arresting Gear with the Super Hornet. To do that, I need to have a Super Hornet pilot who has a landing signal officer qualification. The selection board then looks for an officer with that particular experience.

How are these officers recruited?

Over the past two years, we've participated in at least a dozen recruiting events. Many of these events involve pilots in their test tour returning to their fleet squadron or to a fleet concentration area to talk with folks and give them information on the application process and what the job entails. Other events involve an officer who has had a tour in the acquisition field and then returns to the squadron for their department head or command tour, where they promote awareness of the USNTPS.

My main goal when I talk to fleet squadrons is to promote awareness of the test pilot opportunities. It's not for everyone; it's very competitive. Not everyone gets in, and it is a challenging career field.

What is the USNTPS' curriculum like?

There is a short course and a long course. The short course was designed mainly for NAVAIR engineers because there is simply not enough capacity at USNTPS to send all of the engineers through the long course. We have several offerings each year and graduate 200+ short course students a year. The Short Course Fleet Seat Scholarship Program is designed to allow junior officers an opportunity to see what flight test is like without making a career shift that applying for the long course entails. Having fleet operators attend also benefits the engineers in the class by allowing interaction that they wouldn't normally have otherwise. Additionally, fleet squadrons don't have to pay tuition for fleet seats; USNTPS is paying that tuition for them. I really believe it's a win-win situation for all involved.

A typical long course USNTPS class is made up of 20 to 22 Navy and Marine Corps aviators. We have four or five Army pilots since we train all the Army test pilots. We have an exchange with the U.S. Air Force Test Pilot School based at Edwards Air Force Base (AFB), California. We take one Air Force officer every class, and we send one Navy or Marine Corps officer to the Air Force's school. We also have an exchange program with the United Kingdom's Empire Test Pilots' School, which is the British training school in England, and EPNER, the French test pilot school in France. In addition, we usually have two or three NAVAIR engineers. It's a very diverse class makeup, and that's one of the strengths of the school—the variety of backgrounds.

We have 12 academic instructors, all of whom are government civilians who are recognized experts in their fields. We have several staff with doctorate degrees. The academic portion is designed as an engineering refresher, delivered at an accelerated pace.

We have 24 flight instructors who are active duty military, government civilians or contractors, all of whom graduated from test pilot school. They are knowledgeable professionals who usually hold three different aircraft qualifications, and they often fly two sorties a day.

We have three curricula: fixed wing, rotary wing and airborne and unmanned. Everyone who goes through test pilot school will gain experience in manned aircraft and will have a certain element of how we test unmanned craft as well. We have 44 airplanes—14 different model series—and each student can fly in all of them. For the final project, we look through their logbooks and select an aircraft they have never flown before, give them the manual and have them design a suite of flight tests.

The workload for a student is very high. Our mantra is that a typical day at test pilot school consists of a half a day of academics, a half a day of flying and a half a day of

U.S. Navy photo by Adam Skoczylas

Cmdr. Glenn P. Rioux served as an electronics technician with 10 years of Navy service, attaining the rank of petty officer first class. He served at Naval Air Station Whiting Field, Florida, and Precommissioning Detachment USS Cardinal (MHC 60) before his selection to the Enlisted Commissioning Program in 1997. He simultaneously earned his master's and bachelor's degrees at Virginia Tech. Rioux earned his commission in August 2000, underwent primary flight training in Pensacola, Florida, and selected the E-2C fleet platform. After E-2C flight training, he reported to Carrier Airborne Early Warning Squadron (VAW) 115 with Carrier Air Wing (CVW) 5.

Rioux graduated USNTPS class 131 in June 2007 and reported for duty to Air Test and Evaluation Squadron (VX) 20 as a project officer on the Joint Mission Planning System, Automated Information System and the NC-130H Radar risk-reduction platform for E-2D. He was selected as the 2008 Naval Test Wing Atlantic Test Naval Flight Officer of the Year.

While serving as CVW-5 staff in 2009, he was the E-2C representative as well as the air wing coordinator for communications, cryptographic keys and data links. In September 2011, he served as operational department head to VAW-113.

Rioux returned to VX-20 as the mission systems lead and government flight test director for the MQ-4C Triton Unmanned Aircraft System in December 2013. He next reported to the Naval Air Systems Command's engineering department in support of the Mission Systems Integrated Product Team in the Fire Scout Program Office.

In January 2017, he served as the USNTPS executive officer and assumed command July 12, 2018. Rioux has more than 2,400 flight hours in more than 30 models of jet, propeller and rotary wing aircraft, with 95 hours of combat flight time. His awards include the Air Medal, several Navy and Marine Corps Commendation and Achievement Medals and other personal, unit and service awards.

report writing. There is some truth to that because we have 15 months of skillsets that we are cramming into 11 months. That system, while challenging, has been working well for 74 years, and we know our graduates are well prepared for their jobs in flight test.

What is the career track of a test pilot?

The next job for a test pilot school graduate is as a test pilot at a test squadron, usually a developmental test squadron based at NAS Patuxent River or China Lake or Point Mugu in California, for a two- to three-year test tour. Here, they get to look at the new systems the Navy is purchasing, and they have the opportunity to provide feedback to the program manager, who holds the purse strings. A crucial element of our acquisition process is to have these educated, tactical, technical professionals, who can communicate effectively to the decision makers.

From there, they have several options: continue with an unrestricted line career, return to the fleet potentially for a disassociated sea tour or a department head tour, then move on to compete for operational command; or shift career fields and go into the aviation engineering duty field, which is acquisition, program management, space and production.

How many astronauts were USNTPS graduates?

We have a rich history and heritage at the test pilot school. Founded in 1945, this marks our 74th year of operation. In that time, we have graduated more than 4,400 students in 155 classes. Almost 100 of our nation's astronauts graduated from USNTPS, including Wally Schirra, Alan Shepard, John Glenn and Adm. James Stockdale. We also have other graduates at NASA, such as Maj. Gen. Charlie Bolden, the recent director of NASA, and Lt. Col. Anne McClain, who is in the International Space Station right now.

I want to be a test pilot; how do I apply?

First thing is to look at the naval message to figure out the timing for the selection boards. While you are in a fleet squadron, let the selection criteria drive your qualifications and your performance toward meeting those requirements. The board timing has changed. As of this fiscal year, each of the selection boards has been moved up by two months. We found that in order for our test pilot students to safely execute, we need to provide them pre-arrival training in specific aircraft at Randolph AFB in San Antonio or the Western Army Area Training Site in Phoenix, and therefore, they have to leave their squadrons earlier than the in-residence class start date.

Keep an eye on your timing window, and pay attention to the naval message, which includes two deadlines. The first deadline is for the letter of application signed by the applicant and endorsed by their commanding officer. The second deadline is for additional letters of recommendation or additional information.

Do not wait for all the letters to come in before submitting an application. Submit applications early. Get it in, so that we have a good understanding of those interested in that selection board. Then, follow up later with the letters of recommendation, which, by the way, are not part of the selection criteria. The recommendation letters are an element of the application package, and while taken into consideration, you must meet the selection criteria first.

To find out more, visit **http://www.navair.navy.mil/nawcad/usntps.**

Grampaw Pettibone

Gramps from Yesteryear: May-June 1999

Illustration by Ted Wilbur

Vikings Away

An S-3 Viking with four in the crew was on a familiarization flight for a copilot/tactical coordinator (COTAC). Although the COTAC had more than 1,100 hours in the model, this was his first flight after being out of the cockpit for over three years. During the preflight briefing, the pilot did not discuss specific aircraft coordination and communication requirements as was dictated by air wing standard operating procedures.

In the training area, the pilot initiated entry into a cruise configuration full-stall demo 13,000 feet. The Viking progressed normally into the stall with buffet and wing rollout occurring at the appropriate angle of attack (AOA). This rollout tendency is a normal S-3 stall characteristic and is one of several indicators used to determine that an aircraft has entered a fully stalled condition.

However, the pilot did not ensure that the AOA was adequately reduced prior to power application. As a result, AOA increased and a deeper stall occurred. The S-3 entered a post-stall gyration (PSG), completing nearly two gyrations before the pilot applied out-of-control flight recovery procedures based on the delayed recognition of the PSG.

At this time, the attention of the pilot and COTAC was focused on illuminated trim/speedbrake and master caution lights. Mistakenly believing that these cautions were associated with the departure, the pilot removed his hand from the stick to reconnect the trim/speedbrake channels on the flight control test panel. The aircraft was now 45 degrees nose low, 50 degrees left wing down, and passing 10,000 feet with increasing airspeed as the pilot placed his hand back on the slick.

As the pilot applied recovery control inputs, he noted 8,000 feet on the altimeter, considered ejecting but believed the aircraft was recoverable. He did not convey this to the crew nor did the crew recognize indications of recovery from out-of-control flight. An ejection call was made over the intercom and command ejection was initiated above 6,500 feet with 250 knots airspeed. All hands were rescued within 30 minutes with varying degrees of survivable injuries.

Grampaw Pettibone says …

Singe my socks and pass the bicarb! What happened to professional briefings and knowing proper stall recovery procedures? This isn't the old days when biplane drivers plowed into weeping willows with some regularity, walked away from the crashes and later chuckled about their brush with the Grim Reaper. When there's more than one in the crew, coordination and communication have to be treated as absolute milestones in the briefing process. Knowledge of stall recovery procedures and out-of-control flight wouldn't hurt, either.

Airscoop

Compiled by Andrea Watters and Rob Perry

Presidential Helicopter Program Awards Contract for Six Aircraft

U.S. Navy photo by Adam Skoczylas

On the tarmac is one of the VH-92A Presidential Helicopters undergoing testing at Naval Air Station Patuxent River, Md.

PATUXENT RIVER, Md.—The Navy's Presidential Helicopter Program awarded a $542 million contract to Sikorsky, a Lockheed Martin Company, June 10 to build six VH-92A aircraft, spares and support equipment.

"The team has efficiently leveraged a proven platform with cutting edge government mission systems for rapid agile development of the next helicopters to fly presidential missions," said James F. Geurts, assistant secretary of the Navy for research, development and acquisition. "Optimizing commercial practices, the VH-92A will provide safe, reliable and timely transportation with mission-critical communications that will support the security of our nation. I am proud of the combined government and contractor team who has worked so hard to transition this program into initial production and did so at over $1 billion less than the program's cost baseline."

"The presidential lift mission is a no-fail mission for the Marine Corps," said Lt. Gen Steven Rudder, deputy commandant for Marine Corps Aviation. "We deliver helicopter and MV-22 transportation across the globe to support the requirements of the presidency. The authorization to move forward with procurement of the VH-92A will allow the Marine Corps to deliver the next generation of presidential helicopter support."

The VH-92A aircraft will increase performance and payload over the current presidential helicopters, VH-3D and VH-60N, which have been serving for more than 40 years. The VH-92A will provide enhanced crew coordination systems and communications capabilities, plus improve availability and maintainability.

"The authorization to exercise the program's first Low-Rate Initial Production lot is a testament to the hard work and dedication from the team to deliver this important asset on budget and within the planned acquisition timeline" said Col. Eric Ropella, Presidential Helicopter Program manager. "This award is an example of acquisition done right."

Government testing will continue to validate system performance and prepare for Initial Operational Test and Evaluation planned for mid-2020 and Initial Operational Capability in late 2020.

The Navy and Marine Corps are committed to ensuring mission-critical presidential helicopter transportation is delivered as an integral and worldwide support requirement of the presidency—necessary to conduct presidential duties as Commander in Chief, Chief Executive and Head of State.

From Program Executive Officer (Air ASW, Assault & Special Missions Programs) Public Affairs Office..

F-35 Auto-GCAS Team Wins Collier Trophy

PATUXENT RIVER, Md.—The F-35 Joint Program Office Auto Ground Collision Avoidance System team received the 2018 Robert J. Collier Trophy on June 13 for its rapid design, integration and flight test of critical, lifesaving technology for the global F-35 Lightning II fleet during a ceremony at the National Air and Space Museum.

Automatic Ground Collision Avoidance System (Auto-GCAS) is a technology designed to save a pilot from crashing into the ground by activating and taking control from the pilot to return the plane to safe altitude in the event of a sudden loss of consciousness or target fixation.

Initial testing of the Auto-GCAS began in 2018 on the F-35A at Edwards Air Force Base, California. As Edwards' F-35 Integrated Test Force (ITF) issued its technical report recommending the system for the A variant to the Joint Program Office, the F-35 Pax River ITF, at Naval Air Station Patuxent River, Maryland, began flight tests on the B variant in early 2019, followed by the C variant.

"The Pax ITF test team is working hard to ensure the fleet is provided an Auto-GCAS system that runs silently in the background while never impeding the warfighter's maneuverability," said Lt. Cmdr. William Bowen, F-35 test pilot at the Pax River ITF. "In addition to evaluating Auto-GCAS performance, one of our main goals is to ensure the operator has confidence in the system so as to keep it turned on. Thus far, we have not identified any nuisances with the system interface and are satisfied with its performance."

With the system's successful flight tests complete on the A and B variants, the fleet will receive Auto-GCAS starting later this year, seven years ahead of schedule. The Air Force began integrating the system on the F-35A in July.

"Keeping our service members flying and safe is a top priority," said Eric Buckenmeyer, Auto-GCAS team member at the Pax River ITF. "Getting it to the fleet early is beneficial in two parts. For one, it shows how flexible the program is for getting what the fleet needs when they need/ask for it. Two, it gets ground collision protection software to the fleet before any loss of life can occur."

Auto-GCAS is not a new concept as a similar system flies on the F-16 and F-22 and has already been credited with saving eight Air Force pilots. The F-35 Auto-GCAS software was developed around the concepts and design of the F-16 Auto-CGAS, Buckenmeyer explained.

"I think based on the number of saves already observed on the F-16 since their implementation of Auto-GCAS, getting it to the service members now increases the chances of stopping avoidable loss of life," Buckenmeyer said.

The Pax River ITF was scheduled to wrap up testing on the C variant this summer.

The Auto-GCAS team comprises representatives from Lockheed-Martin, the Air Force, F-35 Joint Program Office, NASA and the Defense Safety Oversight Council.

Written by Connie Hempel, public affairs officer for the F-35 Pax River Integrated Test Force.

U.S. Navy photo by Dane Wiedmann

F-35 test pilot Dan Levin, Pax River Integrated Test Force, flies an Auto Ground Collision Avoidance System (Auto-GCAS) test flight in an F-35C Lightning II on a low level through West Virginia June 17. Flying the low level helps stress the Auto-GCAS software to confirm there are no false collision warnings while flying as close to the ground as operationally representative.

MQ-8C Fire Scout Achieves Initial Operational Capability

U.S. Navy photo

The MQ-8C Fire Scout unmanned helicopter conducts a flight test at Naval Air Station Patuxent River, Webster Field Annex in Saint Inigoes, Md.

PATUXENT RIVER, Md.—The Navy declared Initial Operational Capability of the MQ-8C Fire Scout unmanned helicopter June 28, clearing the way for fleet operations and training.

The MQ-8 Fire Scout is a sea-based, vertical lift unmanned system that is designed to provide reconnaissance, situational awareness and precision targeting support for ground, air and sea forces.

"This milestone is a culmination of several years of hard work and dedication from our joint government and industry team," said Capt. Eric Soderberg, Fire Scout program manager. "We are excited to get this enhanced capability out to the fleet."

The MQ-8C variant is an endurance and payload upgrade to its predecessor, the MQ-8B, offering up to 12 hours on station depending on payload, and incorporates the commercial Bell 407 airframe.

The Northrop Grumman-built Fire Scout complements the manned MH-60 helicopter by extending the range and endurance of ship-based operations. It provides unique situational awareness and precision target support for the Navy.

The MQ-8C has flown more than 1,500 hours and 700 sorties to date. Over the next few years, Northrop Grumman will continue MQ-8C production deliveries to the Navy to complete a total of 38 aircraft.

The MQ-8C will be equipped with an upgraded radar that allows for a larger field of view and a range of digital modes including weather detection, air-to-air targeting and a ground moving target indicator. It will deploy with the littoral combat ship (LCS) in fiscal 2022 while the MQ-8B conducts operations aboard LCS in 5th and 7th Fleets.

From Program Executive Office (Unmanned & Weapons) Public Affairs Office.

CH-53E Heavy Lift Helicopter Logs 1 Million Flight Hours

U.S. Marine Corps photo by Lance Cpl. Julian Elliott-Drouin

Marine Corps CH-53E Super Stallions with Marine Heavy Helicopter Squadrons (HMH) 361, 465 and 466, Marine Aircraft Group 16 and 3rd Marine Aircraft Wing take off June 6 during a flight exercise at Marine Corps Air Station Miramar, Calif.

PATUXENT RIVER, Md.—The CH-53E Super Stallion helicopter reached a major milestone this year when it achieved more than 1 million flight hours since entering service with the Marine Corps in 1981.

The CH-53E is a versatile machine used for amphibious assault and long-range insertion, delivering troops, vehicles and supplies. This rapid resupply vehicle is still one of the most used aircraft in the U.S. military air arsenal.

"The CH-53E has seen more work than was ever anticipated it would see," said Maj. Matthew Baumann, H-53 In-Service, Heavy Lift Helicopter Program Office co-lead.

Currently, there are 142 Super Stallions in service. Despite being out of production, the CH-53E is in the middle of a "RESET"—a rolling period of rebuilding, upgrading and increas-

Live-fire Missile Training

Electronic Attack Squadron (VAQ) 209 conducted a live-fire missile event off the coast of California June 19. The "Star Warriors" successfully fired five AGM-88B/C High Speed Anti-Radiation Missiles in the Naval Air Warfare Center Weapons Division Sea Test Range. This evolution provided training for the Star Warrior's ordnance personnel, maintenance professionals and aircrew alike. Having the rare opportunity to fire live missiles prior to employing them in combat allows aircrew to gain experience and the ability to react rapidly and be more lethal in a combat scenario.

U.S. Navy photo by Cmdr. Cameron Dekker and Cmdr. Peter Scheu

Marine Corps receives final RQ-21A Blackjack UAS

PATUXENT RIVER, Md.—The Navy and Marine Corps Small Tactical Unmanned Aircraft Systems (UAS) Program Office delivered the final RQ-21A Blackjack system to the Marines at Marine Corps Air Station (MCAS) Cherry Point, North Carolina, June 12.

The final system will serve as a training asset for the fleet readiness detachment at MCAS Cherry Point. Marine Unmanned Aerial Vehicle Squadron (VMU) 2, also located at Cherry Point, will maintain the system.

VMU-3, located in Hawaii, received their fourth and final system in March completing the squadron deliveries. This delivery closes out the Marine Corps' total order of 21 Blackjack UAS.

"As we wrap up the production phase of the RQ-21A program for the Marine Corps and Navy, we have also been transitioning to continued sustainment for the fleet to include platform and payload capability improvements," said Col. John Neville, Small Tactical UAS program manager. "While it's a normal shift in the life of any program, we maintain our focus on system readiness, affordability and capability improvements to ensure Blackjack remains a critical intelligence, surveillance and reconnaissance capability that's relevant for the warfighter."

Lt. Col. Russell Strange, Medium UAS lead, said the program will also seek to add capability to the system and grow the customer base for foreign military sales.

"Increased capability will include work on command and control, communication systems, avionics, optics, laser designation and payloads," Strange said.

From Program Executive Office (Unmanned & Weapons) Public Affairs Office.

U.S. Marine Corps photo by Lance Cpl. Auburne Johnson

A Marine places the starter into an RQ-21A Blackjack during a recent Weapons and Tactics Instructor course at Canon Air Defense Complex in Yuma, Az.

ing safety, reliability and capabilities to lengthen its service life through 2032.

According to Baumann, the first 25 helicopters have completed their RESET process, "allowing the squadron commanders to plan for training, operations and maintenance with renewed confidence."

Resetting of the CH-53E fleet is an important segue from the current platform to the new CH-53K King Stallion, its heavy-lift replacement.

"The CH-53K is the most powerful helicopter ever built by the U.S. military," said Col. Jack Perrin, Heavy Lift Helicopter program manager. "It will be safer, faster and more capable than any previous heavy lift helicopter in the battlespace."

Its development is currently in the testing and capability requirements phase, with a goal of bringing the CH-53K to fleet Marines by 2024.

"It's a game-changer," Perrin said. "We can't wait to have the K available for fleet use. But for now, we've got a capable, reliable and safe helicopter doing heavy-lift for our Marines."

Written by Victoria Falcon, Strategic Communications, Heavy Lift Helicopter Program Office.

VP-40 Qualifies PPC on Last P3 Deployment

U.S. Navy Photo by MC2 Jakoeb Vandahlen

Members of Patrol Squadron (VP) 40 and Lt. McKenna Cox celebrate her patrol plane commander qualification.

5TH FLEET AREA OF OPERATION—Lt. McKenna Cox, a pilot with Patrol Squadron (VP) 40, qualified May 19 as patrol plane commander on the P-3C Orion platform.

A patrol plane commander (PPC) is responsible for the overall safety of the aircraft and crew during flight. Obtaining this qualification is a milestone for Cox as she becomes a fully qualified P-3 naval aviator.

"I specifically selected VP-40 because I wanted to sundown the P-3C," Cox said. "I knew I'd be going to the West Coast as part of any of the VP squadrons, but I chose VP-40 because I wanted to be one of the last to fly on this platform."

The P-3C is a maritime patrol and support aircraft that started its career in the Navy in the 1960s supporting missions in anti-submarine warfare, overland surveillance and search and rescue operations.

"People like flying the P-3 because you control all of the inputs," Cox said. "You are hand-flying a Cold-War era bird, and it is just a different type of flying that, with newer aircraft and more automation, is going away."

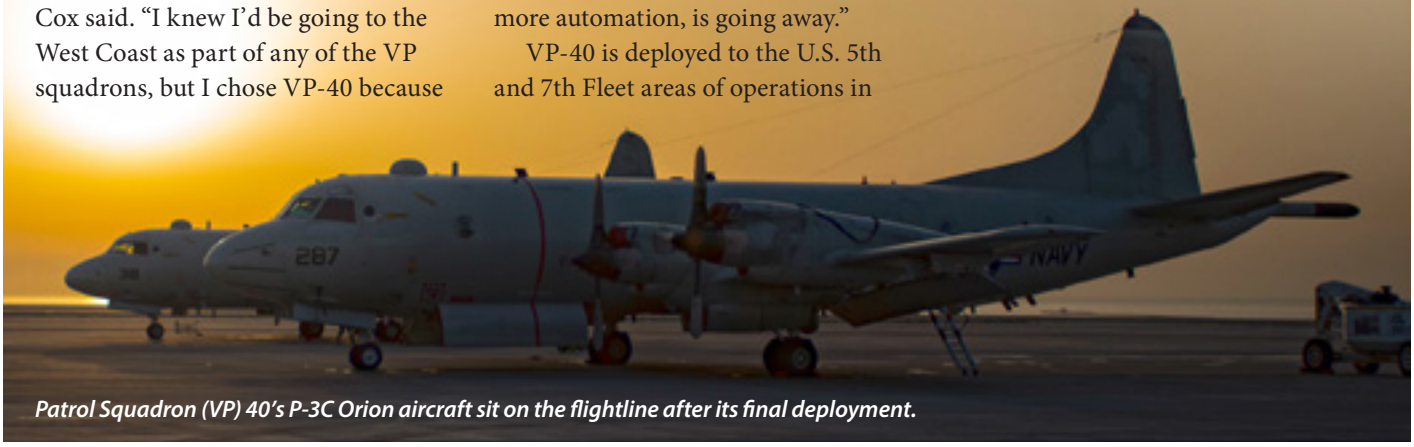
VP-40 is deployed to the U.S. 5th and 7th Fleet areas of operations in support of naval operations to ensure maritime stability and security. VP-40 is the last active-duty maritime squadron to fly the P-3C, and after this deployment will transition to the P-8A Poseidon.

"McKenna is the type of officer and aviator that we all strive to be," said Cmdr. Matt McKerring, VP-40's Commanding Officer. "The care she demonstrates for her Sailors and her commitment to the 'Fighting Marlin' team is unmatched. We could not be more proud of her and this tremendous achievement."

In addition to her duties as a pilot, Cox has served as 1st Lieutenant, branch officer of the aviation structural mechanic (safety equipment) and aircrew survival equipmentman branches, the line division officer and as a sexual assault and prevention victim advocate.

"It takes a village to make a PPC," Cox said. "I know it sounds cheesy, but this wouldn't be possible without the support and time given to me by my peers and mentors."

Mass Communication Specialist 2nd Class Jakoeb VanDahlen supports VP-40 Public Affairs.



U.S. Navy Photo by MC2 Jakoeb Vandahlen

Patrol Squadron (VP) 40's P-3C Orion aircraft sit on the flightline after its final deployment.

U.S. Navy photo by MC2 Timothy Schumaker

The Blue Angels Flight Demonstration Squadron's C-130T transport aircraft, affectionately known as "Fat Albert," completes one of its final practice demonstrations in April at Naval Air Station Pensacola, Fla.

Blue Angels Get 'Fat Albert' Replacement

PATUXENT RIVER, Md.—The Navy awarded a contract June 13 to the United Kingdom's Ministry of Defence (U.K. MOD) for the purchase of one C-130J Super Hercules.

The four-engine, six-blade turboprop aircraft is the next U.S. Navy Flight Demonstration Squadron's logistical support aircraft, commonly called "Fat Albert."

"This is a win-win for the United States Navy and the United Kingdom Ministry of Defence," said Capt. Steven Nassau, Tactical Airlift Program Office program manager. "Just as the Navy recognized the imminent need to replace the 'Fat Albert' aircraft, the U.K. MOD was divesting of an American made, C-130J aircraft, allowing us to acquire a suitable replacement aircraft at a major cost savings."

The acquisition is a result of teamwork between the U.K. MOD DESA Sales, MOD Air Support, Marshal Aerospace and the program office acquisition team.

The program received congressional approval to proceed with the acquisition in March 2018, and the purchase was funded by repurposed foreign military sales proceeds from retired U.S. Navy and Marine Corps C-130 aircraft. The $29.7 million contract is at least $50 million less than the cost of a new aircraft.

The newly acquired J-Model Super Hercules completes the transition from the previous legacy C-130T Hercules, which the squadron retired in May after 17 years. While the C-130J will be the only variant of its type the Navy uses, the C-130J is familiar to the U.S. Air Force and shares common components with the KC-130J flown by the Marine Corps.

"From identifying the technical requirements, support equipment, engineering development and support efforts, it was a total team effort, and we need to recognize the incredible Naval Air Systems Command collaboration that allowed us to get where we are in such a short time period," said Jack Miller, KC-130J Integrated Product Team lead. "To have a turn-key aircraft in place just two years from receiving funding is quite an accomplishment."

The new aircraft will undergo a major periodic maintenance interval inspection to baseline its maintenance schedule. It will also get a new paint job and a slight configuration adjustment to align the aircraft with the existing KC-130J model inventory, familiar to the Marines who will operate and maintain it. To expedite the acquisition, Marshall Aerospace in Cambridge, England, will conduct the inspection and modifications.

"Our partners at the U.K. MOD and Marshal Aerospace have been instrumental in executing this extremely challenging acquisition," said Lt. Col. Robert Hurst, KC-130 deputy program manager. "We have always had a great partnership with the U.K., and this only adds to the list of ways we accomplish great things together."

In the meantime, the Blue Angels' logistical support aircraft requirement is relying on borrowed Navy or Marine Corps C-130T assets, affectionately nicknamed "Ernie." Delivery of the replacement J-Model Super Hercules is expected in spring 2020.

Written by Valerie Doster, communications support for the Tactical Airlift Program Office.

New NAWCAD Lakehurst Robotic Welder Improves Production Time, Safety

U.S. Navy photo

Naval Air Warfare Center Aircraft Division (NAWCAD) Lakehurst welding artisans use the robotic welder to overhaul an improved low loss launch valve body in order to bring it back up to the quality required to return it to the Navy's supply system.

LAKEHURST, N.J.—A new robotic welder is helping reduce production time and costs, while increasing readiness and the safety of welding artisans here.

The Naval Air Warfare Center Aircraft Division (NAWCAD) Lakehurst's Prototyping and Manufacturing Division (PMD) implemented a robotic welder in February to overhaul improved low loss launch valve (ILLLV) bodies, part of the steam catapult system on aircraft carriers.

The PMD welding artisans spend 160 hours or more welding the body seats of the ILLLV, often in extreme-heat conditions of up to 400 degrees Fahrenheit. Because of the high temperatures, the artisans need to take safety breaks, which increases the amount of production time needed to complete the overhaul and get the ILLLV components back to the fleet.

"The launch valve is inherently difficult to overhaul," said Liza Scafuro, head of the PMD Launcher and Support Equipment Branch. "When we get them from the fleet, the condition of the valve varies from one valve to the next, so even though we have set procedures for their inspection and repair, additional work may be required."

The artisans also have to remove the corrosion that builds up on the ILLLV while it's on the aircraft carrier to bring the ILLV back up to the quality required to return it to the Navy's supply system.

The new robotic welder reduces the production time of the ILLLV body from 160 hours over three weeks to just 18 hours over three days.

It also removes the artisans from the extreme heat environment for approximately 90 percent of required tasks, allowing them to focus on other necessary ILLLV components and increasing their safety.

"PMD's robotic welder initiative exemplifies Naval Air Systems Command's goal of bringing both speed and quality to the products we supply to the fleet," said Kathleen P. Donnelly, acting executive director for Lakehurst. "Just as important, it's increasing safety for our artisans and improving their work environment. Great job to the entire team for bringing this innovative idea into fruition through the Capital Investment Program."

The Capital Investment Program is a NAWCAD program that reinvests in infrastructure to modernize and improve command activities in support of mission requirements.

"The feasibility and qualification process of the robotic welding system for the ILLLV program was rigorous, which yielded a system that met all of PMD's goals," said Joseph Strickland, a PMD welding engineer. "As a result of the increased personnel safety and decreased production time, the robotic welding system has become an integral part of the ILLLV welding process."

PMD will evaluate the performance of each ILLLV body and improve the process as needed.

After seeing the benefits to the ILLLV body, PMD is also researching using the robotic welding program to reduce other ILLLV component welding production times.

"This is a great accomplishment for the ILLLV Overhaul and Build Program," Scafuro said. "We always look for opportunities where we can save cost and time. The robotic welder was one of those opportunities that significantly benefitted the program. This validated all the effort and hard work that the team had put into improving the time and reducing the cost of welding the seats on the ILLLV bodies."

Written by Allison Murawski, public affairs officer at NAWCAD Lakehurst.

Two NAWCAD Engineers Receive Presidential Recognition

WASHINGTON—President Donald J. Trump named two engineers from Naval Air Warfare Center Aircraft Division as recipients of the Presidential Early Career Award for Scientists and Engineers in an announcement from the White House July 2.

Dr. Brandon Cochenour, an electrical engineer, and Dr. James Hing, a robotics engineer, will receive the Presidential Early Career Award for Scientists and Engineers (PECASE), the government's highest honor, during a ceremony at the Daughters of the American Revolution Constitution Hall in Washington, D.C.

The White House confers PECASE awards annually to name the nation's most outstanding STEM professionals who show exceptional promise to advance science and technology.

Cochenour—an engineer with NAWCAD's Avionics Sensors and Electronic Warfare Division at Naval Air Station (NAS) Patuxent River, Maryland—leads research and development of the optics industry's next generation laser systems pioneering the use of "twisted" laser beams that can enhance sensing, imaging and communications undersea, as well as in air and fiber, with both commercial and defense applications.

His work is uncovering new and more sensitive means of remote sensing and communications using light. Commercially, the research has applications in industries like oil and natural gas, autonomous automotive, wireless communications and environmental monitoring. Importantly, his research helps enhance the Navy's information dominance and battlespace awareness at sea for anti-submarine and mine warfare missions.

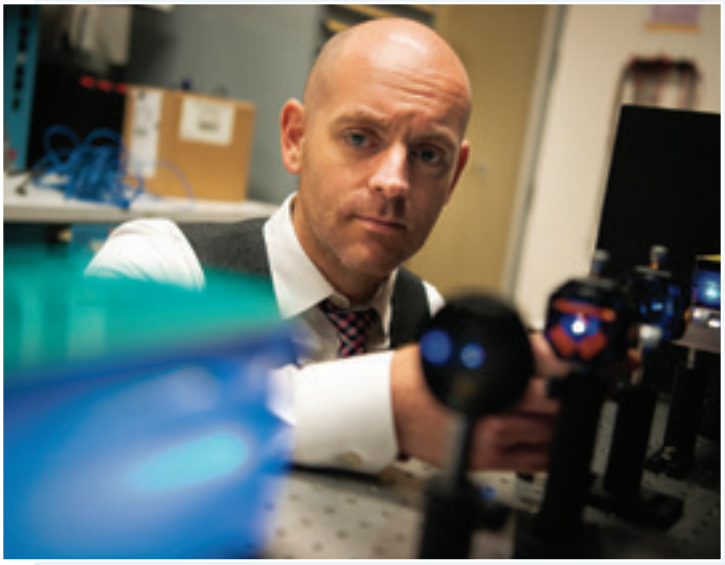
"Being recognized as a PECASE awardee is truly humbling," Cochenour said. "Receiving the award is also a validation of the support structure that I am surrounded by at Pax. Without excellent mentors, world-class colleagues and talented students none of this success would be possible."

Hing—a lead of NAWCAD's Advanced Technology Branch at Joint Base McGuire-Dix-Lakehurst, New Jersey—helped establish the lab that researches and develops robotics that optimize aircraft carrier workloads. His work focuses on increasing Sailor safety and efficiency on the flight deck while allowing service members to focus on work that is more important.

"To be selected amongst all the amazing engineers and scientists supporting government agencies was a complete surprise and still has me in a state of disbelief," Hing said. "I've been so fortunate in my career at NAWCAD to have had the opportunity to work on research that fully engages my technical curiosity and also has the potential for positive impact on the safety and operational capabilities of our Sailors and Marines."

The PECASE awards are not firsts for either scientist. Cochenour is a NAVAIR Fellow, SMART Scholar, three-time recipient of DOD's Dr. Delores M. Etter Science Award, Maryland Academy of Science's 2009 Outstanding Young Engineer of the Year, and holds other trade conference accolades. DOD named Hing Scientist of the Quarter in 2017.

From Naval Air Warfare Center Aircraft Division Public Affairs.



U.S. Navy photos

Dr. Brandon Cochenour, an electrical engineer with Naval Air Warfare Center Aircraft Division (NAWCAD), demonstrates how twisted light travels through ocean water.

Dr. James Hing, NAWCAD Lakehurst recipient of the Presidential Early Career Award for Scientists and Engineers, helped establish the Robotics and Intelligent Systems Laboratory at Lakehurst in 2013.

FRCW Sailor Earns First Depot Level Certification, Saves Navy Millions

LEMOORE, Calif.—Aviation Structural Mechanic 1st Class Michael Hammer achieved a level-two advanced composite material repair certification in January that was previously limited to civilian artisans at depot maintenance facilities.

When first stationed at Fleet Readiness Center West (FRCW) in Lemoore, California, in 2009, Hammer was interested in earning his level-two certification. During his second tour there, the Military Depot Level Certification Program was getting started, and he was the first military member to participate.

"This has been an amazing experience. It has been challenging at times, but worth it for all of the knowledge I have gained," Hammer said.

Hammer sees the significance of training Sailors to be level-two qualified. "I'm hoping this will open many opportunities for others and lead to composites becoming a career Navy Enlisted Classification similar to non-destructive inspection or welding."

U.S. Navy photo by AD2 Hema Puran

Aviation Structural Mechanic 1st Class Michael Hammer lays out several plies onto a vacuum bag with dry carbon fiber inside in preparation of a hole-25 repair on Door 68, the engine bay door on a F/A-18 Super Hornet.

Advanced composite repair is just the first level-two certification available to Sailors and Marines as the workforce proficiency team expands the program to component repairs.

A Sustainment Vision 2020 (SV2020) initiative, the certification program enables Hammer to make advanced composite repairs. Historically, only civilian artisans at depot-level facilities were qualified to make these repairs, which involved shipping parts from the fleet to the depots, often resulting in a long-term down aircraft.

Since his certification, Hammer has performed 80 hours of work on 18 different parts resulting in a savings of more than $4 million in just seven months, according to Keith Johnson, SV2020 deputy director and team lead for workforce proficiency.

"That kind of savings across the enterprise could allow funds to be redirected to other areas of need or simply could reduce the cost of doing business," Johnson said.

One of the major goals of SV2020 is to reduce turnaround times and costs of aircraft repairs. By enabling Sailors and Marines to receive the training and qualify for this depot-level certification, more parts will be eligible for repair at the squadron or operational-level rather than shipped to intermediate- or depot-level facilities.

"Simply removing the additional steps of packaging and shipping parts, that alone will save days, even weeks. Plus, the shorter turnaround time of the repair puts the part back on the shelf faster, in a ready-for-issue status providing an asset to help keep aircraft mission capable," Johnson said.

Repairing aircraft at the I-level is also more cost effective. Johnson noted, "Every dollar we save, returns money back to the flying program."

The workforce proficiency team identified five additional sites for implementation of the program: FRCMA Oceana, FRCNW Whidbey Island, FRCSW North Island, Marine Aviation Logistics Squadron (MALS) 16 San Diego and MALS-36 Okinawa.

A coordinator at each site will refer Sailors and Marines for the depot-level certification based on the following criteria:

- Individual's drive to excel
- Current qualifications including, at a minimum, collateral duty inspector (CDI) qualifications
- Minimum two years left on their enlistment
- Recommendation of division leadership

"These requirements will provide personnel that are somewhat senior and have demonstrated a high level of proficiency in their associated work," Johnson said, highlighting the importance of finding qualified Sailors and Marines, like Hammer, who will remain at the command.

From Commander, Fleet Readiness Center Public Affairs.

Change of Command

Dwyer Takes Command as Chief of Naval Air Training

U.S. Marine Corps photo by 1st Lt. Pawel Puczko

Rear Adm. Daniel Dwyer takes the lead in a T-45C Goshawk during an aerial change of command ceremony aboard Naval Air Station Corpus Christi, Texas, as Rear Adm. Gregory Harris relinquishes command.

CORPUS CHRISTI, Texas—Rear Adm. Gregory "Hyfi" Harris relinquished command as Chief of Naval Air Training (CNATRA) to Rear Adm. Daniel "Dozer" Dwyer during a ceremony aboard Naval Air Station Corpus Christi July 26.

The aerial change of command took place with both Dwyer and Harris flying in T-45C Goshawk jet aircraft from Training Air Wing 2 in Kingsville, Texas.

Harris and Dwyer read their orders and Dwyer's aircraft moved ahead of Harris' to take lead of the formation, signifying his assumption of command. Commander, U.S. 3rd Fleet Vice Adm. John Alexander, who flew with Harris, welcomed Dwyer aboard while colleagues, friends and family listened to the exchange from the ground.

Harris has been in command as CNATRA since July 2018. He is an F/A-18 pilot with more than 4,200 flight hours, 1,045 arrested landings, and has flown more than 100 combat missions in support of Operations Desert Shield, Desert Storm, Southern Watch, Enduring Freedom, and Iraqi Freedom. Harris will move on to his next position in Washington, D.C., as director, Air Warfare, Office of the Chief of Naval Operations.

Dwyer takes over as CNATRA following his command of Carrier Strike Group 9, which consists of more than 7,000 Sailors across nine ships including USS Theodore Roosevelt (CVN 71), USS Bunker Hill (CG 52), USS Zumwalt (DDG 1000), six guided-missile destroyers of Destroyer Squadron 23, and 80 aircraft of Carrier Air Wing (CVW) 11.

"I am very honored to serve as our Navy's Chief of Naval Air Training," Dwyer said. "I look forward to the challenges ahead, working with the nearly 7,000 dedicated professionals that make up CNATRA. We are Naval Aviation."

From Chief of Naval Air Training Public Affairs.

VFA-125 Changes Command

LEMOORE, Calif.—Strike Fighter Squadron (VFA) 125, the "Rough Raiders," welcomed a new Commanding Officer during a change of command ceremony June 8. VFA-125 is the fleet replacement squadron for the Navy's F-35C Lightning II.

Cmdr. Adan Covarrubias relieved Capt. Tommy Locke Jr. during an airborne ceremony above Naval Air Station (NAS) Lemoore. Locke assumed command in April 2017, shortly after the first F-35C arrived at NAS Lemoore and the squadron was reactivated in January that same year.

Under his leadership, the Rough Raiders implemented the full-spectrum of aviation operations, maintenance, training and safety programs for the F-35C. This significantly contributed to several milestones, including the induction and syllabus completion of the first newly-winged F-35C flight students, the Safe-for-Flight Operations Certifications for the first operational Navy F-35C squadron, the Initial Operational Capability declaration in February 2019 and the first carrier-deployed Autonomic Logistics Information System.

The Rough Raiders completed more than 3,300 flight hours encompassing more than 2,000 mishap-free sorties. Locke's next duty assignment is to Carrier Air Wing (CVW) 2 at NAS Lemoore as deputy, Carrier Air Group.

Locke attributed the success of his tour to the tenacity and hard work of the Rough Raider team. "This program is where it is today because of you," Locke said. "If you put this aircraft in the hands of motivated Sailors and Marines, there is nothing they cannot accomplish."

Covarrubias is the 43rd CO to lead the Rough Raiders, and served as CO for VFA-101 "Grim Reapers" at Eglin Air Force Base in Fort Walton Beach, Florida.

"My plan as the commanding officer for this squadron is to continue to provide the support that the fleet needs to bring this incredible aircraft and all the personnel and programs associated with it to our warfighters," Covarrubias told the squadron. "For me and this team, that is the No. 1 priority. The F-35C is the right aircraft for the carrier air wing of tomorrow."

Written by Lt. Cmdr. Lydia E. Bock, Commander, Joint Strike Fighter Wing Public Affairs Officer.

U.S. Naval Test Pilot School rotary instructor, Barb Gordon prepares to land the same UH-60L Black Hawk she flew during the single-engine test technique event during which she and her Army test pilot under instruction experienced catastrophic engine failure.

U.S. Navy photo by Erik Hildebrandt

TEST PILOT INSTRUCTOR EARNS NAVY'S FIRST ARMY BROKEN WING AWARD

U.S. Naval Test Pilot School (USNTPS) rotary instructor Barb Gordon was the Navy's first to receive the Army's Broken Wing Award at a ceremony June 6 at Naval Air Station Patuxent River, Maryland.

By Brittany Dickerson

Highly regarded and rarely awarded, the Army gives the Broken Wing Award to aircrew who have minimized or prevented loss of life and aircraft through outstanding airmanship during inflight emergencies. Gordon's award marked the first time the Army presented the Broken Wing outside the service.

Col. John Jones, Commanding Officer of the Army's Redstone Test Center (RTC) in Redstone Arsenal, Alabama, presented the award to Gordon, a former naval lieutenant commander, who recovered the UH-60L Black Hawk while training a test pilot under instruction Oct. 5, 2016.

During the single-engine test technique with one engine at idle, the helicopter suffered failure on the opposite engine. Gordon had fewer than five seconds to recover the aircraft and experienced rates of descent between 9,000 and 12,000 feet per minute. According to the investigation, the mishap would have

U.S. Navy photo by Liz Wolter

U.S. Navy photo

Gordon accepts the Army Broken Wing Award from Col. John Jones, Commanding Officer Redstone Test Center during a ceremony June 6 at Naval Air Station Patuxent River, Md.

Gordon, the Navy's first to receive the Army's Broken Wing Award, prepares for a performance flight demonstration in the same UH-60L Black Hawk.

been catastrophic if not for the immediate actions taken by Gordon and former student Sylvia Grandstaff, now chief warrant officer 3 and a test pilot at RTC.

"After recovering the aircraft, the flight back to Pax was the longest seven minutes of my life," Gordon recalled. "Sylvia and I were fully prepared to put the aircraft down anywhere; had we not followed the exact procedures we'd just briefed, we might have been picking pine needles from the bottom of the aircraft if we survived."

"Barb and Sylvia displayed that flight test can be done safely without negative outcome," Jones said. "The Army appreciates your training, mentorship and expert airmanship."

Grandstaff also received a Broken Wing Award for her extraordinary skill during the incident at USNTPS. She attributes the aircrew's survival to the nature of flight test rather than skill. Gordon and Grandstaff had discussed the exact risk of engine failure and emergency procedure during both preflight and inflight briefings before the test demonstration.

"It's the culture of flight test that made the difference on the flight Barbara and I were on," Grandstaff said. "Had it been just any other training flight, it might have gone differently."

"After recovering the aircraft, the flight back to Pax was the longest seven minutes of my life."

Both Gordon and the UH-60L continue to fly students during rotary technique training at USNTPS, the only domestic source of rotary test pilots and the Army's dedicated test pilot school.

Today, Gordon has students fly a bit higher, adding ample space between her aircraft and the ground. What is left of the mishap's failed engine sits on Gordon's desk and underlines the extreme level of risk—and importance—of the developmental test pilot, whose objective is to bring aircraft to the point of failure to ensure the safety and success of service members on the flight line.

The inherently risky discipline requires just that, plus extraordinary skill in the cockpit and aptitude as an engineer.

"When people ask if we changed how we do things after the mishap at USNTPS, the answer is no," Gordon said. "We survived, because test pilots plan for unique and unusual situations like the engine failure. That is what USNTPS gives students; without immediate critical thinking and risk management, things can get exponentially worse."

Brittany Dickerson is a Naval Air Warfare Center Aircraft Division Public Affairs Officer.

TRITON TRAINERS:

New Devices Prepare Maintainers for Deployment

By Jeff Newman

Maintainers with Unmanned Patrol Squadron (VUP) 19 are saving money by using aircraft trainers built by the Triton program, as the Navy's first unmanned squadron prepares to deploy with the MQ-4C Triton later this year.

Traditionally, a platform's prime manufacturer is considered the source to develop its trainers—full-scale devices meant to emulate operational aircraft and systems for training purposes—as part of its overall production contract.

Looking for cost savings and avoidance, the Persistent Maritime Unmanned Aircraft Systems Program Office used Naval Air Systems Command resources to produce instructional courses and six maintenance trainers concurrent with Triton, the Navy's new persistent, high-altitude surveillance unmanned aircraft system (UAS).

The program contracted a veteran-owned small business comprised of retired Navy maintenance chiefs and first-class petty officers to align trainer requirements, develop courses and provide interim training to the fleet.

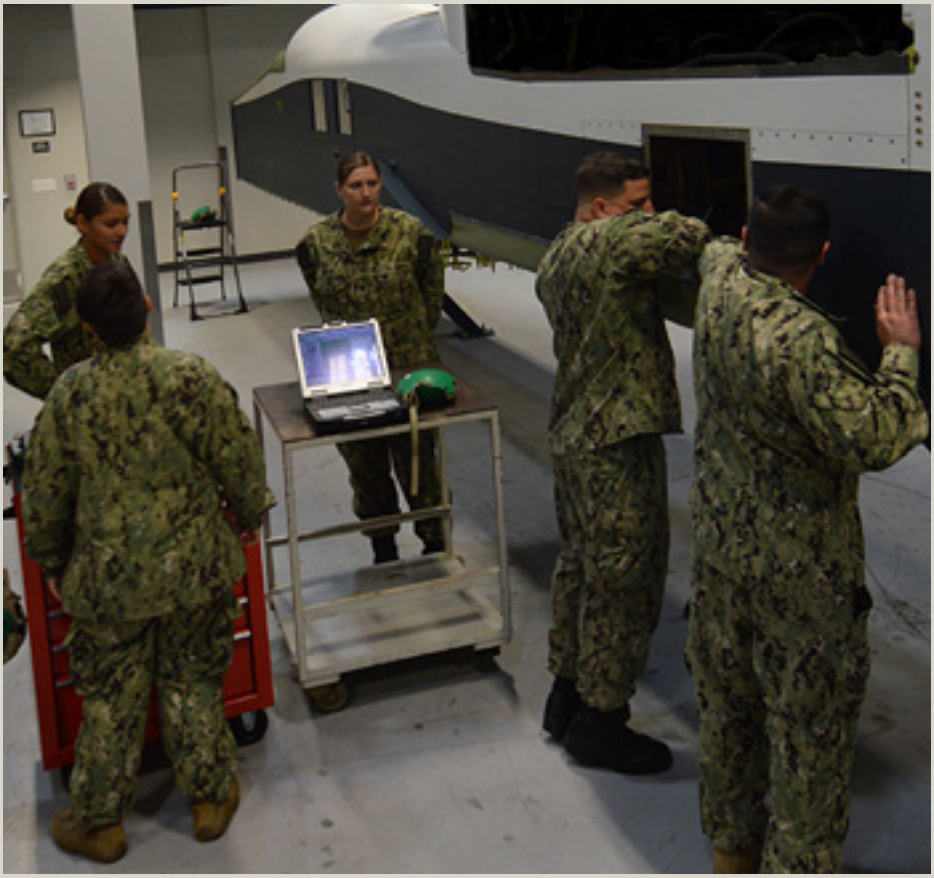
The program office used the capabilities of the Naval Air Warfare Center Aircraft Division's Simulation Division (SimDiv) to design and fabricate five of the trainers while Naval Air Warfare Center Training Systems Division in Orlando, Florida, helped integrate and test the SimDiv trainers and developed the sixth trainer, a Multi-Purpose Reconfigurable Training System (MRTS3D®). The combined result is a robust turnkey maintenance training system tailored to Triton and enabling the Center for Naval Aviation Technical Training (CNATT) to meet C School pipeline training requirements.

Based on what similar devices have cost to produce and upgrade in the past, the Triton program estimates internal development of the six maintenance trainers and associated courses has resulted in significant savings, said Steve Groff, deputy lead for the Triton Training Systems team.

"These trainers cost a little more upfront, but the lifecycle costs are drastically decreased," Groff said. "What we're building is 100-percent government owned. We own all the software, all the trainers, all the parts—everything. Where, when a prime builds it, there's proprietary software in there, so we're always tied to the prime to go back to do software updates or update to the trainer."

The team has delivered three of the trainers to CNATT detachment at Naval Base Ventura County in Point Mugu, California: a power plant trainer in August 2018, followed by a flight controls trainer in February 2019 and the MRTS3D® in April 2019.

The power plant trainer was first used last winter to support a pilot course for VUP-19 aviation machinist's mate rate. Aviation electrician's mate (AE) and aviation structural mechanic



U.S. Navy photos

Sailors from Unmanned Patrol Squadron (VUP) 19 DET Point Mugu and CNATT DET Point Mugu train on a power plant trainer at Navy Base Ventura County Point Mugu.

Aviation electricians mate (AE) 1st class William Bostick, left, works on a keyboard to activate the flaps on the flight control trainer as AE1 Chris DeSimone assists during the training session.

(AM) rates have also begun training on the power plant and flight controls trainers. Before the trainers arrived, VUP-19 maintainers received three weeks of classroom instruction. With the trainers, the AE and AM courses have expanded to give Sailors hands-on experience to supplement their academic course.

A landing gear trainer has completed development at Naval Air Station Patuxent River, Maryland, and is being shipped to Point Mugu this summer. The team has also begun developing the final two devices—an integrated avionics trainer and forward-operating-base mission control station trainer.

The goal is to have maintainers leave for deployment "pretty much knowing their job inside and out on that airplane," Groff said. "They know where everything is, which panels to pull, and they'll have changed almost every type of component at least once."

These training devices will also help save time.

"A weapons system, start to finish, is what the Navy needs to go out and execute our mission across the world. Having a training device that is exactly like what they're going to see when they go out to the flight line will reduce the amount of time it takes to get a jet operational," said Lt. Cmdr. Charlie Steele, Triton Training Systems lead.

Students spend approximately one-third of their time in the classroom and the rest working on the trainers, said AE2 RitaMarie Tarnowski, an AE instructor with CNATT Det. Point Mugu.

"The trainers are extremely interactive," she said. "Everyone is impressed with the training. Students say they get more hands-on training here than they've gotten in their command so far, because on the trainers, they're able to touch everything, remove everything and replace everything."

Julia Roscher, a test engineer from the training division, visited the schoolhouse with her team in May to test the equipment on site and obtain feedback from operators, who will eventually deploy with Triton's VUP 19. The team worked closely with both the CNATT detachment in Point Mugu and the Triton program throughout the development process to ensure they met their training requirements, she said.

"We made the decision to incorporate the CNATT instructors much earlier in the development process than is the custom and that has made them very smart on the system," Steele said. "They were able to provide relevant feedback directly to the engineers on what worked well and what could be done better, which has helped streamline the developmental and test processes."

"The Triton training team has done an outstanding job of managing their limited funding, salvaging two damaged surveillance UAS and leveraging lessons learned from other programs. They've laid the groundwork for the U.S. Navy's future unmanned systems—this is ready, relevant learning at its finest—I'm really proud of their work," said Capt. Dan Mackin, Triton program manager.

U.S. Navy photo

AE3 Elizabeth Camacho collaborates with AM3 Kelsey Davis to change panels on a power plant trainer.

The Triton program also procured a Rolls-Royce AE 3007 engine from NASA, which flies a Global Hawk on Earth science missions, and an older, unwanted Air Force Global Hawk fuselage to use in the power plant and flight controls trainers, respectively.

In addition, the program completely refurbished an old apprentice school at Point Mugu into its Triton maintenance school. As part of the facilities modification, the school now houses a fiber optic wire connector lab and composite repair shop, which includes equipment such as curing ovens, deep freezers for hazardous material storage and four downdraft tables for grinding and sanding operations.

The Triton program has roughly 8,000 identified maintenance tasks. "It's not feasible to train everything, so the five trainers were designed to train to about 2,000 of the maintenance requirements," said Richard Johnson, SimDiv project lead.

"We capture 25 percent of all maintenance tasks required in the formal training environment between these five trainers," said Earl Woodard, Maintenance Training Systems lead. "That may sound small, but those are the critical, repeatable tasks the front-end analysis identifies as what the maintainers are expected to encounter within a three-year operational tour."

Just as important as building the trainers has been developing the courses, a unique challenge, because the squadron will be the Navy's first to operate unmanned aircraft solely.

"All of our previous backgrounds involve the operation of the aircraft systems in the cockpit environment, which is the norm for manned aircraft," Woodard said.

Triton is the Navy's first major aviation platform in decades without a direct predecessor from which to draw information and people.

Johnson brought in two former Air Force fleet instructor maintainers to lend their expertise from working on Global Hawks. Though the two platforms are similar, there are still significant differences between the aircraft and the two services' maintenance practices, he said.

"We're building from scratch with no fleet knowledge of any kind. There's no baseline here," Groff said.

Absent such a foundation, the retired chiefs and first-class petty officers developing the courseware are using their collective decades of experience as maintainers and instructors—many of them taught in Navy schoolhouses—to inform the training material.

"It's a once-in-a-lifetime opportunity to actually fix the training shortfalls that bothered you when you were running the squadron shops," Woodard said. "When they were coming up, it was handed to them as the system that existed. Now they have an opportunity

to say, 'What would I like to have gotten from the schoolhouse when I was in the shop?'"

VUP-19 is also the first Navy squadron to incorporate the information systems technician (IT) rate as part of its corps of aircraft maintainers.

"Normally, ITs are responsible for computer-based systems. We have to train Triton ITs now to work on an airplane and a forward-operating base. In a Triton squadron, they are an integral part of the maintenance organization," he said.

Similarly, the course for VUP-19's AEs are the longest of any rate in the squadron, when traditionally the AE class is one of the shortest at Navy maintenance schools.

"On Triton, AEs touch everything except payloads," Woodard said.

"Because of all the electrical systems on Triton, our AE course is almost as long as the avionics course," Groff said.

Ultimately, the Triton training team hopes its experience developing a maintenance training program for the Navy's first unmanned squadron can end up benefiting future UAS programs and squadrons, beginning with the Navy's next major unmanned platform, the MQ-25A Stingray.

Groff said his team is already in early discussions with the Unmanned Carrier Aviation Program Office, which oversees the Stingray program.

"We want to make sure that the things we did and the lessons learned transition to Stingray and the next UAS platforms," he said. "The 'should cost' versus the 'would cost' are where we're trying to help the Navy save money in the future."

Jeff Newman is a staff writer for Naval Aviation News.

U.S. Navy photos

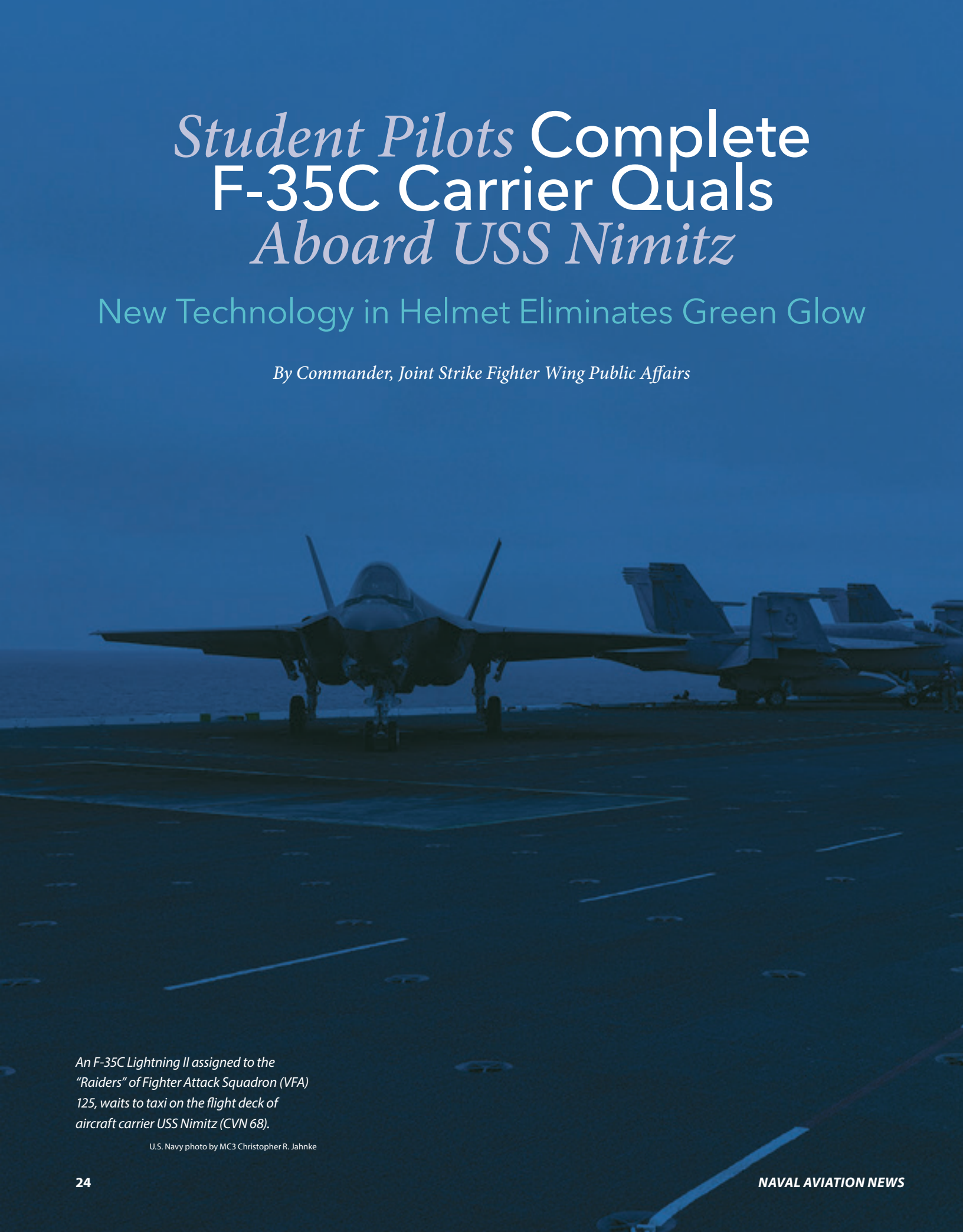
AE2 Amra Dempsey operates a touch screen display for the MQ-4C Triton UAS.

AE1 Adam Thompson controls the power plant trainer as AE1 Dennis Duran goes through a check list.

Student Pilots Complete F-35C Carrier Quals *Aboard USS Nimitz*

New Technology in Helmet Eliminates Green Glow

By Commander, Joint Strike Fighter Wing Public Affairs



An F-35C Lightning II assigned to the "Raiders" of Fighter Attack Squadron (VFA) 125, waits to taxi on the flight deck of aircraft carrier USS Nimitz (CVN 68).

U.S. Navy photo by MC3 Christopher R. Jahnke

The U.S. Navy F-35C program's first Category 1 students completed night carrier qualifications aboard USS Nimitz (CVN 68) July 18, using the latest organic light-emitting diode (OLED) advancements for the F-35C helmet mounted display system (HMDS).

During previous carrier detachments, F-35C students without previous night carrier experience were not allowed to complete night carrier arrestments due to complications from the helmet's "green glow" created from liquid crystal display (LCD) technology in the Generation III HMDS. This glow made it difficult to see the full resolution of the night vision video feed and hindered pilots' ability to distinguish the carrier's lighting environment during low-light combat configuration.

In an interview last August aboard USS Lincoln (CVN) during Operational Testing I, then-commanding officer of Strike Fighter Squadron (VFA) 125 Capt. Tommy Locke said, "There are some complexities with the green glow that we deal with now, but we only do it with experienced pilots. In that really dark environment, you can't get the display down low enough where you can still process the image on

U.S. Navy photo by MC3 Christopher R. Jahnke

One of VFA 125's F-35Cs launches off the flight deck of aircraft carrier USS Nimitz (CVN 68) during student night carrier qualifications in July.

"The improved Generation III helmet, with OLED technology, works as advertised and is on its way to being fully implemented into the F-35C community."

the display and once you bring the display up high enough where it can, that information conflicts with the outside world."

The new OLED technology reduces green glow-induced pilot disorientation by only illuminating the active pixels and providing a crisper picture. All VFA-125 and VFA-147 Category 1 pilots were able to successfully complete their initial night carrier qualifications aboard USS Nimitz using the OLED-updated HMDS. Category 1 pilots are newly-winged aviators who have no previous night carrier experience and have never flown a fleet aircraft. They are the priority for receiving OLED technology and it will eventually be provided to all F-35C pilots.

"All of our Category 1 pilots successfully completed their night carrier qualifications during the squadron's latest detachment to USS Nimitz," said VFA-125 Commanding Officer, Cmdr. Adan Covarrubias. "The improved Generation III helmet, with OLED technology, works as advertised and is on its way to being fully implemented into the F-35C community."

The OLED solution requires both hardware and software updates to the HMDS and the display management computer, helmet (DMCH) in the aircraft. These modifications are completed in-house by Navy personnel.

The advancement of these capabilities enhances a pilot's situational awareness and reduces workload during low-light night carrier landings. When combined with the F-35C's stealth technology, state-of-the-art avionics, advanced sensors and weapons capacity and range, the latest HMDS provides pilots with an advanced aircraft interface that offers unprecedented air superiority and advanced command and control functions through fused sensors. These state-of-the-art capabilities give pilots and combatant commanders unrivaled battlespace awareness and lethality.

U.S. Navy photo by MC2 Ian Kinkead

Sailors signal that a VFA-125 F-35C is ready to launch from USS Nimitz.

U.S. Navy photo by MC3 Olivia Banmally Nichols

The Raiders land their F-35C on the flight deck of USS Nimitz.

Sailors inspect a VFA-125 F-35C before it launches.

U.S. Navy photo by MC3 Olivia Bannmally Nichols

An MH-60S Seahawk helicopter, assigned to the "Indians" of Helicopter Sea Combat Squadron (HSC) 6, and a VFA-125 F-35C land aboard USS Nimitz.

U.S. Navy photo by MC3 Christopher R. Jahnke

VX-23 Tests New F-35 Helmet Mounted Display

By Lt. Cmdr. William "Carney" Bowen III

During F-35C Lightning II Developmental Test III in August 2016, three Navy developmental test pilots determined the "green glow" level associated with the liquid crystal display (LCD) Generation III Helmet Mounted Display System (HMDS) was deficient and resulted in unsuitably high workloads during low-light night carrier landings to the USS George Washington (CVN 73).

In response to this deficiency, the F-35 Joint Program Office funded the rapid development of a prototype HMDS that uses organic light emitting diode (OLED) technology to eliminate the green glow associated with display projection.

In October 2017, Air Test and Evaluation Squadron (VX) 23's F-35 Carrier Suitability Department completed an evaluation of the prototype OLED HMDS culminating with two "Salty Dog" pilots executing low-light night carrier landings to USS Carl Vinson (CVN 70).

Both pilots reported favorable results with the prototype OLED HMDS—noting a total absence of green glow and a pronounced reduction in overall workload during the low-light night carrier-landing task as compared to legacy aircraft. Consequently, the OLED HMDS became a Program of Record in 2018.

In March 2019, the same two VX-23 pilots evaluated the production representative version of the OLED HMDS. In addition to verifying the production representative, OLED HMDS performance met or exceeded that seen with the prototype during low-light night flight test.

At the same time, a number of off-nominal catapults and arrestment test points were executed at the Naval Air Station Patuxent River, Maryland, TC-7 and MK-7 test sites to verify the new OLED HMDS could survive the carrier environment.

Following these successful test events, Strike Fighter Squadron (VFA) 125 and VFA-147 took Category 1 students aboard USS Nimitz, where they successfully completed their night carrier qualifications using the OLED-updated HMDS.

Lt. Cmdr. William "Carney" Bowen III is an F-35C test pilot with Air Test and Evaluation Squadron (VX) 23.

The F-35C helmet mounted display system includes the latest organic light-emitting diode technology.

U.S. Navy photo by Lt. Cmdr. Lydia Ellen Bock

Marines Make Virtual Training A Reality

By Lt. Michelle Tucker

The dream of becoming jet pilots was just within their reach.

Self-professed mechanical engineering geeks, Andy and Matteo Occhipinti commissioned as second lieutenants in the Marine Corps in 2013. But by October 2017, the brothers were on the verge of flunking out of the intermediate phase of flight school. Determined to succeed, they built a system that would not only save their careers but would also help their classmates and future students.

Their story is emblematic of perseverance and ingenuity and shows how, in today's Navy and Marine Corps, junior personnel play a vital role in identifying and addressing a broad range of issues.

"I was amazed," said Rear Adm. Greg Harris, Chief of Naval Air Training (CNATRA). "It's innovation from within Naval Aviation and from within our students. When we start letting students help us understand how they are learning differently, instead of us dictating how we think they're going to learn, we are better off."

The Early Years

The roots of the Occhipintis' success go back more than two decades. With a model F-14 Tomcat jet in hand, 4-year-old Matteo Occhipinti stepped foot on American soil for the first time in 1996, and something about that toy airplane struck a lasting chord. He and his identical twin brother, Andy, had just immigrated from Sicily to Long Island, New York, with their parents.

The Occhipinti family later settled in Crystal Lake, Illinois. Eager to serve the nation, at age 16, the brothers enrolled in the Marine Corps Delayed Entry Program—an accession program for qualified individuals to enlist in the military. After some research, however, they were hooked on the idea of becoming Marine Corps pilots.

Matteo studied at the University of Illinois at Chicago, while Andy studied at Illinois Institute of Technology. After graduating from The Basic School in Quantico, Virginia, the Occhipinti brothers reported to Naval Air Station (NAS) Pensacola, Florida, for introductory flight screening (IFS). IFS is a fast-paced course designed to provide initial flight screening to ensure students are aeronautically adaptable.

After IFS, students advance to aviation preflight indoctrination (API), during which student naval aviators study aerodynamics, weather, aircraft engines and systems, navigation, and flight rules and regulations.

Feeling the part

It was Friday, but it wasn't just any Friday. Friday of the last week of API was special. Matteo stepped into his new, sage green flight suit for the first time. Crisp and complete with name patches, putting it on was like a rite of passage.

"It was the first time we got to feel just a little like military pilots," Matteo recalled.

Matteo and Andy left Pensacola and reported to NAS Whiting Field, Florida, for primary flight training. There, they took to the air in an orange-and-white-painted Beechcraft T-6B Texan II single-engine turboprop trainer aircraft—an ejection seat-equipped aircraft that requires a G-suit to help circulate blood back to the heart during high gravity force maneuvers in flight. After graduation, the Occhipintis both selected the strike-fighter training pipeline, leading them down the path to fly jets.

They reported for intermediate jet training at NAS Meridian, Mississippi, one of two locations for the strike pipeline. It was their first introduction to the McDonnell Douglas T-45C Goshawk jet trainer aircraft. With the look of a sleek compact fighter jet, the T-45C is just 39 feet in length with a top speed of approximately 645 mph. Matteo and Andy were ready to step up to the next level, but they soon learned

U.S. Navy photo by Anne Owens

Marine 2nd Lt. Charles Webb practices a training flight on a newly implemented virtual reality training device at Training Air Wing (TAW) 4 aboard Naval Air Station (NAS) Corpus Christi, Texas.

U.S. Navy photo by Anne Owens

Here, Webb advances the power control lever.

U.S. Navy photo by Anne Owens

Webb maintains coordinated flight using the rudder pedals.

Marine Capt. Matteo Occhipinti uses virtual reality goggles, part of a trainer system he and his brother, 2nd Lt. Andy Occhipinti, developed to supplement training.

Photo courtesy of Andy Occhipinti and Matteo Occhipinti

their student Navy standardization scores were below the cutoff. At the risk of being dropped from training, they had to make changes.

Together, Matteo and Andy reviewed and categorized more than 600 grade sheet comments, found their shortfalls and concluded they needed to improve their study habits.

Virtually There

Focused and determined, the Occhipintis moved on to advanced jet training. They sought the help of a former student who had used a virtual reality (VR) device to supplement their training.

"There were things that we couldn't practice without actually flying," Matteo said. "We wanted to see the sight picture, gain the knowledge, practice what we were going to do in the actual jet and get the repetitions we needed."

While flight simulators mimic an entire flight, VR training devices focus on either one specific skill area or a group of areas. The problem with the existing flight simulators was they couldn't accommodate multi-aircraft mission profiles

Photo courtesy of Andy Occhipinti and Matteo Occhipinti

Marine 1st Lt. Andy Occhipinti, left, and Marine Capt. Matteo Occhipinti, right, pose in front of a T-45C Goshawk with their classmate, Navy Lt. j.g. Daniel Ryan, during advanced jet training at Training Air Wing (TAW) 1, NAS Meridian, Miss., in March 2018.

or allow the student a 360-degree field of view. Seeing and communicating with other aircraft that may be directly behind a pilot is a critical part of tactical formation, basic fighter maneuvers known as dogfighting, section engaged maneuvering (SEM), road reconnaissance (RR) and section low-level flight procedures. A VR training device with multi-aircraft link capability could help bridge that sight-picture gap from the ground, giving students experience in a safe environment before flying in a real aircraft.

They set up in the corner of a classroom with two black computer towers on a desk with two monitors positioned in front of them. Beside the desk was an old, five-wheeled office chair. The blue, fabric-covered seat had a rectangle hole cut out at the front, creating a fat, U-shaped seat and making the perfect spot for the joystick or hands-on throttle-and-stick, which was screwed into place. On the floor lay the rudder pedals to assist with coordinated flight around the vertical axis of the virtual aircraft.

The throttle panel was positioned to the left, just as it would be in a T-45C. The VR goggles looked like squared off and blacked out ski goggles with a strap over the top. They housed the display that would transport the viewer into the virtual cockpit. In all, the system cost the brothers approximately $6,000 to build. It was far from perfect, but it didn't need to be.

While Matteo and Andy built the physical system, they needed some help to get the software to display a more realistic picture of the cockpit and outside scenery. Enter Navy Lt. j.g. Jason Bruno. Another mechanical engineering major, the three immediately hit it off.

"They knew I was really into computer programming," Bruno said. "It started out with programming the air-to-air TACAN [tactical air navigation system], which shows your distance from each other if you're linked up with another plane. I just started opening up the files and changing a few things to make them work."

What started off as a few minor changes led to a complete overhaul of the avionics programming. Bruno also created graphics that mirrored the T-45C cockpit and its heads-up display, switches and lights. Knowing where to read instruments quickly, much like driving a car, can help students remain focused on tasks outside the aircraft.

Their VR device could link up to eight aircraft together at a time and included a tool that tracked aircraft position, air speed, altitude and more. It recorded exactly how maneuvers were executed and identified corrections needed, but most important, it was debriefable.

Being able to chair fly a mission with a VR training device on the ground provided a huge advantage. Not only did it improve the Occhipintis' scores in the air, but after sharing the device with classmates, all the students' scores improved by approximately 8.5 percent for SEM and 22 percent for RR flights. The brothers' device proved so effective the class completed the last phase of training with zero unsatisfactory flights among the group—a rarity.

Executing training flights, known as "student Xs," with no re-flies means students can learn faster and potentially advance to a higher competency level in the same period of time. It also puts fewer flight hours on the aircraft to achieve the same results. While not the ultimate goal, reduced training hours

U.S. Navy photo by MC1 Chris Liaghat

Marine Capt. Matteo Occhipinti, left, Cmdr. Steven Vitrella, Commanding Officer of Training Squadron (VT) 7, 1st Lt. Andy Occhipinti and Navy Capt. Nicholas Mungas, commodore of TAW-1, pose for a photo before the twin Occhipinti brothers simultaneously receive their gold aviator wings at the chapel at NAS Meridian in July 27, 2018.

preserves the life of the aircraft, decreases fuel costs and increases the number of students who can complete flights between scheduled aircraft maintenance intervals.

Boosting Future Readiness

Impressed with the VR device, instructor pilots, along with squadron and wing-level leadership, saw an opportunity for the trio to present their idea to Harris during a scheduled trip to Meridian.

"It was definitely a little bit of backyard engineering," Harris said. "But when I sat down and flew, the very first thing that I wanted to do was fight BFM [basic fighter maneuvers], and it was fun."

Making training fun is one of many important considerations, according to Wil Merkel, CNATRA's simulator requirements officer.

"If someone is interested, enjoys and is learning in an area, they're going to want to spend more time in that, and they're going to advance faster," Merkel said. "We're talking about a revolution in training. We're dealing with a young generation of students who, from the age of 1 or 2 years old, have had a tablet or some kind of device in their hand."

Although VR trainers will never replace real experience, they can help prepare students to maximize their time when they step inside a flight simulator or aircraft.

Acquiring new military gear can be a lengthy process, but Harris said he saw great value in the Occhipintis' VR trainer and tasked his staff to procure a robust setup that would withstand the rigors of multiple student use.

In April 2018, the Air Force launched the Pilot Training Next (PTN) program, which uses current and emerging technologies to accelerate pilot training. Collaborating with PTN program developers and an Army acquisition program, and considering the Occhipinti brothers' system, CNATRA staff procured new VR trainer devices within 90 days. Complete with spare parts, tech support and cyber security, etc., each unit cost approximately $20,000, Merkel said.

Now there are four T-45 VR trainer devices available to students at Training Air Wing (TAW) 1 at NAS Meridian; four at TAW-2 at NAS Kingsville, Texas; six T-6 VR trainer devices at TAW-5 at NAS Whiting Field and four at TAW-4 at NAS Corpus Christi, Texas. Following Harris' direction for primary and jet training, CNATRA's simulator requirements team is working to procure similar VR trainer devices for rotary-wing and multi-engine aircraft platforms; the rotary wing VR trainers are expected to be placed in service in early fiscal 2020.

The Occhipinti brothers continue to excel in their aviation careers. Andy is assigned to Marine Fighter Attack Training Squadron (VMFAT) 101 in Miramar, California, where he flies the F/A-18C Hornet. Matteo is assigned to VMFAT-501 in Beaufort, South Carolina, where he flies the F-35B Lightning II.

"No one gets through training by themselves," Matteo said. "If you're good at certain syllabus events, teach others. The one who struggles but works [hard] will be there to help when you don't know the answers. Those bonds last a lifetime, and it all starts in flight school."

Lt. Michelle Tucker is the public affairs officer for Chief of Naval Air Training.

SPEED TO THE FLEET:

U.S. Navy photo by Adam Skoczylas

By Liz Mildenstein

A new brake maintenance tool for V-22 is saving hundreds of work hours and material costs for fleet maintainers.

Twenty-seven "Martin Brake Tools," named after their inventor, Marine Cpl. Timothy Martin, were developed, manufactured and delivered in just two months to all the V-22 Osprey intermediate-level maintenance sites.

The Naval Air Warfare Center Aircraft Division Lakehurst's V-22 Support Equipment (SE) Team, based at Joint Base McGuire-Dix-Lakehurst in Lakehurst, New Jersey, spearheaded this effort.

"The Lakehurst team took what Cpl. Martin developed, created a logistics package, mass produced the tool and delivered it to the fleet in a few months," said Col. Matthew Kelly, V-22 Joint Program manager. "Their efforts to deliver this game-changing maintenance tool are truly impressive."

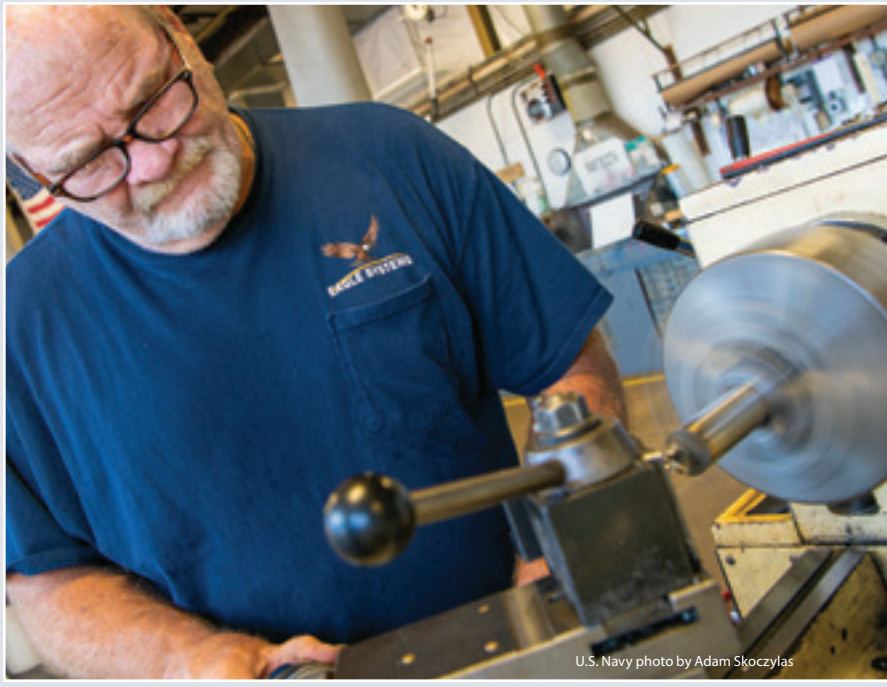
The tool helps remove screws from the brake keys of the V-22's main landing gear wheels.

During a recent Boots on the Ground event, Martin, an aviation hydraulic mechanic from Marine Aviation Logistics Squadron 26, described the problem and solution: "Our Marines who work in our tire shop were having a hard time removing brake key screws, because the screws would often get stripped while attempting to remove them," he explained. "I made a plastic body and a metal screw and nut to fill the space in between the sides of the wheel half. This allows the application of adequate pressure to the heads of the screws."

Previously, the 18 screws were removed individually, and during the process, approximately one in every four would strip. The damage resulted in up to an hour and a half of additional maintenance to complete the removal. The Lakehurst team estimates the new tool will decrease stripping to one screw in every 10 brake jobs.

The tool may look simple, but it has the potential to save millions of dollars in resource reductions and material costs. With the initial prototype alone, the new tool led to the expedient repair of 17 wheel assemblies and helped save 320 workhours and more than $229,000 in material costs.

U.S. Navy photo by Peter Fitzpatrick



U.S. Navy photo by Adam Skoczylas

The stock is being bored to create the part between the threaded shaft and the body of the Martin Brake tool. Rich Hofer, an artisan with the Support Equipment Test and Evaluation Branch Prototype Shop, aligns the machine.

NAVAIR Fields Marine's Brake Tool Innovation

Based on this initial success, the SE team took the reins, refining the design and ensuring the tool could withstand repeated use by fleet maintainers. With this design, they also selected the final materials to create the production set.

"The prototyping and preliminary fleet evaluations were nearly complete at the start of our effort; as such, we were able to save additional development time," said Deirdre Quigley, V-22 SE team lead. "We only had to make a few modifications to the tool and materials; once we tested those changes, the tool was ready for production."

The design, production and distribution remained organic, using resources within the Naval Air Systems Command. Engineers from the V-22 Joint Program Office and a team within the NAWCAD Aircraft Prototype Systems Division at Naval Air Station Patuxent River, Maryland, produced the tool using their machining resources.

"We leveraged the expertise of several machine shops and competencies to make this fast-moving project a reality," Quigley said.

Initial fleet feedback from the performance acceptance test was positive, and with the production lot delivered, the returns in costs savings are projected to be significant.

Liz Mildenstein is the Public Affairs Officer for the V-22 Joint Program Office.

U.S. Marine Corps video by Cpl. Paige C. Stade

Marine Cpl. Timothy Martin demonstrates the Martin Brake Key Tool at Marine Corps Air Station New River, North Carolina, March 15. Martin developed the tool for use on the V-22 Ospreys to save the Marine Corps money and labor intensive hours performing maintenance on the aircraft. Martin is an aviation hydraulic mechanic assigned to Marine Aviation Logistics Squadron 26, Marine Aircraft Group 26, 2nd Marine Aircraft Wing.

U.S. Navy photo by Peter Fitzpatrick

U.S. Navy photo by Adam Skoczylas

Hofer compares the finished piece to the stock item. After an hour of machining, the part is complete.

Need A Part Halfway Around the World Quickly?

WE CAN DO THAT

NAVAIR Continues Solving Emergent Fleet Requirements Using Additive Manufacturing

By Rob Perry

A damaged metal plug, roughly the size of a shot glass, was keeping a Marine All-Weather Fighter Attack Squadron (VMFA) 242 F/A-18D Hornet in Japan on the ground.

Damaged in June during maintenance on the aircraft, the shorting plug tells the pilot how many weapon stations are available on the aircraft.

The squadron reached out to the manufacturer who told them it could take up to 500 days to manufacture and ship a replacement part to Japan.

Unwilling to allow a plane to remain grounded for a year and a half, the fleet reached out to the additive manufacturing (AM) team at Naval Air System Command (NAVAIR), based at Naval Air Station Patuxent River, Maryland, to see if the team, led by Liz McMichael, could find a quicker solution.

Over the weekend, the AM integrated product team (IPT) and program office engineers built a technical data package for a replacement plug and sent it to the team in Japan. Marine Aviation Logistics Squadron (MALS) 12—one of the fleet maintenance organizations that has a 3D printer—printed, installed and validated the new plug and worked with the AM IPT to tweak and finalize the design.

The final design was printed and installed by MALS-12 and the aircraft was back in service seven days after their request.

This incident highlights the speed NAVAIR's additive manufacturing team delivers to the fleet.

NAVAIR's AM Process

Additive manufacturing is the process of building an object in layers using 3-D printers that extrude materials such as plastic polymers or powdered metals. Traditional or "subtractive" manufacturing typically involves

An F/A-18D Hornet with Marine All-Weather Fighter Attack Squadron (VMFA) 242, Marine Air Group 12, 1st Marine Aircraft Wing, on the flight line at Marine Corps Air Station Futenma, Okinawa, Japan.

U.S. Marine Corps photo by Lance Cpl. Savannah Mesimer

cutting or machining bulk materials into an object.

Using digital models, 3-D printers can create in hours what would normally take days or weeks to make using traditional methods. The technology also allows for innovative designs that are either not possible or unfeasible via subtractive manufacturing.

"3-D printing is really not about the printers; it is about having the right data so that the printers consistently make a part we know will work on an airplane. The digital technical data the team develops for the fleet ensures that they get the same part every time," McMichael said."

"Digital technology enables us to use AM to accelerate manufacturing and provide agile solutions," she added.

When it came to creating the replacement cap for the F/A-18, McMichael explained the steps the AM team takes in addressing requests for parts.

The first step is to contact the AM help desk via email at navair_am.fct@navy.mil to request assistance. Then, the team goes to work, first determining the risk level of the part.

"If the part fails, is there a safety issue or mission performance issue? Or is it a part that doesn't impact safety or mission and we can be more flexible in how we make it?"said Ling Xu the NAVAIR AM IPT engineering lead. "We work closely with engineering to understand the airworthiness and performance risk of every part we want to make via AM."

AM parts are sorted into "blue box" or "green box" categories based on their risk level. Blue box parts have airworthiness, safety or mission performance implications and require higher levels of manufacturing controls and approvals. Green box have no airworthiness, safety or mission performance implications if they fail.

"Once we had agreement from the [F/18

The additive manufacturing team at Naval Air Systems Command recently used 3-D printing technology to create a shorting plug backshell for a VMFA-242 F/A-18D Hornet. The replacement backshell, seen in orange here, was created with a polymer-based substance, making it tougher than the original aluminum part. It houses the wiring for the shorting plug, left and right.

U.S. Navy photos

Program Office] that the shorting plug was in the green box category, our next step was developing a design that did the same thing as the metal plug but could be made by the fleet. Since they only had a polymer printer we had to develop a polymer design," said Jor-El Sanchez, AM innovation cell lead. "We have the same printers that the fleet uses so we were able to develop and prototype the new design before we sent it to them. We also make sure that we prototype using the same materials they have."

There was one other obstacle to clear: The polymer plug needed to add electromagnetic interference shielding and wiring to match the functionality of the metal plug. The AM team worked with program office engineers to quickly develop the updated wiring design for the plug.

"As far as polymer goes, every AM part we redesign to meet required performance. The redesign we did here is a more efficient, lighter-weight design that does the same thing as the metal plug," Xu said.

From there, the team developed the first iteration of the technical data package, which included detailed instructions on how to manufacture the part and emailed it to MALS-12.

"Instead of sending parts back and forth, we're sending data back and forth. We're sending them a full manufacturing package [via the Internet], and because we are sending the data, the timeline is much shorter," McMichael said.

MALS-12 then printed out the part, installed it on the F-18, tested and documented that it worked. The AM team incorporated feedback from MALS-12 and formalized the technical data package before the aircraft was cleared for flight.

The technical data package is now available on the AM repository site and can be downloaded and printed anywhere in the Navy or Marine Corps should the part be needed again. In the meantime, the AM team is refining the package to make producing the part even easier, McMichael said.

Contributing to Fleet Readiness

"Additive manufacturing is not only supplying parts on demand but increasing agility," said Dan Krivitsky the NAVAIR AM manufacturing lead.

U.S. Marine Corps photo by Lance Cpl. Stephen Campbell

Marines with Marine Aviation Logistics Squadron (MALS) 12 go through their processes and procedures before conducting a hot loading of MK-82 High Explosive General Purpose bombs on a Marine Corps F/A-18D Hornet with VMFA-242.

U.S. Navy photo

The shorting plug backshell reassembled.

"Our goal is to make the parts that are holding our airplanes down, the ones-y, twos-y parts needed right now. We have the organic capability to do that and meet those needs quickly, but we don't want to replace the supply system or the original equipment manufacturers—we need them," he said.

The next challenge the NAVAIR AM IPT is working on is quantifying AM's contributions to fleet readiness. They are looking at aircraft dashboards, which list the equipment and part challenges affecting each type/model/series to identify which parts additive manufacturing can produce. Those potential AM parts will then be analyzed to see how fast they can be produced and at what cost.

"The intent is to figure out where the return on investment is. As the technology improves, we are seeing costs going down, even for metal and some of the more complex components," McMichael said. "So far, we are seeing a significant cost improvement for low criticality, low-risk polymer parts. Our average is about a 70-percent cost improvement over the supply cost, with our average delivery time 97 percent faster than supply," McMichael said.

To find out more, contact the AM help desk at navair_am.fct@navy.mil.

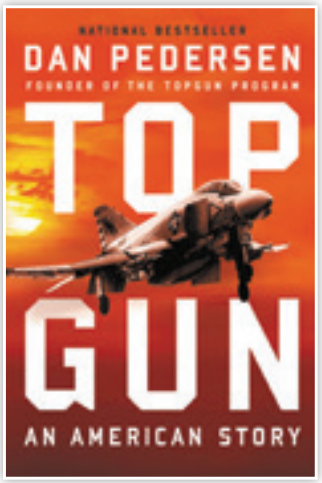
Rob Perry is a staff writer for Naval Aviation News.

Professional Reading

By Cmdr. Peter Mersky, USNR (Ret.)

Topgun, An American Story

By Dan Pedersen, Hachette Books, New York, Boston, 2019



Reasonably priced in today's market, this deeply personal memoir of a fighter pilot's life and his major role in founding the iconic Fighter Weapons School, more familiarly known as TOPGUN, was a surprise. I did not expect much more than a paper roll of dates and names of pilots accompanied by a litany of the individual's accomplishments in and out of a Phantom cockpit. I was dead wrong. Even the customary single folio of photographs, many in color during pre-Vietnam days, was a pleasure.

Published to coincide with the 50th anniversary of TOPGUN's founding, this book also took advantage of major help from the acknowledged leader of Naval Aviation historians, Barrett Tillman, whose distinct, no-nonsense style of writing mixed with occasional service humor definitely helps any manuscript. But the book is definitely retired Capt. Pedersen's, and he can be justly proud of what he has written.

Although the book begins with a minor error, namely that Rolling Thunder began in 1968 when actually that abortive campaign ran from March 2, 1965, to Nov. 1, 1968 (I was at Naval Air Station Kingsville, Texas, then, and I remember the changes of face and attitude from my lieutenant instructors, many of whom had only recently returned from the terrible missions over Hanoi, Haiphong and other cities where they lost friends and shipmates).

This error on dates notwithstanding, the book quickly picks up steam and never looks back.

Pedersen devotes early chapters to his flight training, and after getting his wings, the free-for-all atmosphere off southern California, where eager young fighter pilots met for impromptu

America's Round-Engine Airliners: Airframes & Powerplants in the Golden Age of Aviation

By Craig Kodera & William Pearce, Specialty Press, Forest Lake, MN., 2019

Co-author Craig Kodera created a minor stir when his book on collecting vintage aircraft models was published in 2014. Kodera, a former Air Force transport and tanker pilot and world-class aviation artist, has come up with another, thoroughly enjoyable book on a seldom-described subject—the vintage pre-jet piston-engine (round engine) airliners of the 1920-1950 period. Those of us old enough to remember such classics as the DC-3 and DC-6 will have a great time going through this trove of vintage, absolutely beautiful photos, with accompanying text and captions written in a loving, informal, often humorous style that combines to make one of the most valuable modern references in recent memory.

I've flown in DC-3s and their Navy counterpart R4Ds, and even the Navy's last EC-121 Constellation. After 50 years, the memory is still strong of long cross-country flights (in both directions) in unpressurized creaking C-118s (Navy DC-6s) struggling to maintain altitude through rainstorms at 7,000 to 10,000 feet, landing at Andrews Air Force Base in driving rain storms at 0600 at the end of two-week stretches in California. Occasional short hops in C-131s, Navy derivatives of the twin-engine Convair 440s, are also part of my recollections as I browsed through this new book, which covers civilian aircraft, and to a lesser extent, their military counterparts. But that is how I know them, all part of a very colorful era.

It's all here, even flashbacks to movies of the 1930s. Remember the 1934 Shirley Temple film "Brighteyes"? It centered on an orphaned moppet's adventures around the local airport filled with planes of the period, including the top-of-the-line Douglas DC-2, just entering airline service.

dogfights, learning their trade in the uncontrolled atmosphere of "Fight's on! Check six!"

He describes in fascinating detail his 1963 mission in an F3H Demon, flying from USS Hancock (CV 19), off the coast of South Vietnam, where he sees flashes from ashore that seemed like gunfire aimed at him, perhaps the first such encounters in the coming long war. He goes on to recall the first engagements such as F-8 driver Dick Schaffert's epic December 1967 battle against overwhelming odds and North Vietnamese MiG-17s.

Perceiving a need for a dedicated advanced course in air-combat maneuvering during the mid-war period of the Vietnam conflict, when the ratio of downed North Vietnamese MiGs was very disappointing, Pedersen and his fellow F-4 and F-8 pilots came up with a plan for such a course. They also needed a place on which to erect this admittedly expensive and flexibly administrated syllabus they hoped would bring official support. It wasn't easy, and initial classes found themselves using borrowed shacks and flight lines from friendly tenant commands at NAS Miramar north of San Diego, colloquially known as "Fightertown" in the Pacific fleet.

The crux of Pedersen's account is here, and it is fun and well worth reading. The story of TOPGUN has been told quite a few times. And, of course, the iconic Tom Cruise movie of 1986 certainly went a long way to publicize what the school eventually came to mean, if a bit overstated in typical Hollywood style. And with a sequel to the movie now scheduled to appear in 2020, the once-named Fighter Weapons School is now banished to NAS Fallon in the wilds of western Nevada.

Douglas A-4C/L Skyhawk in Navy Service

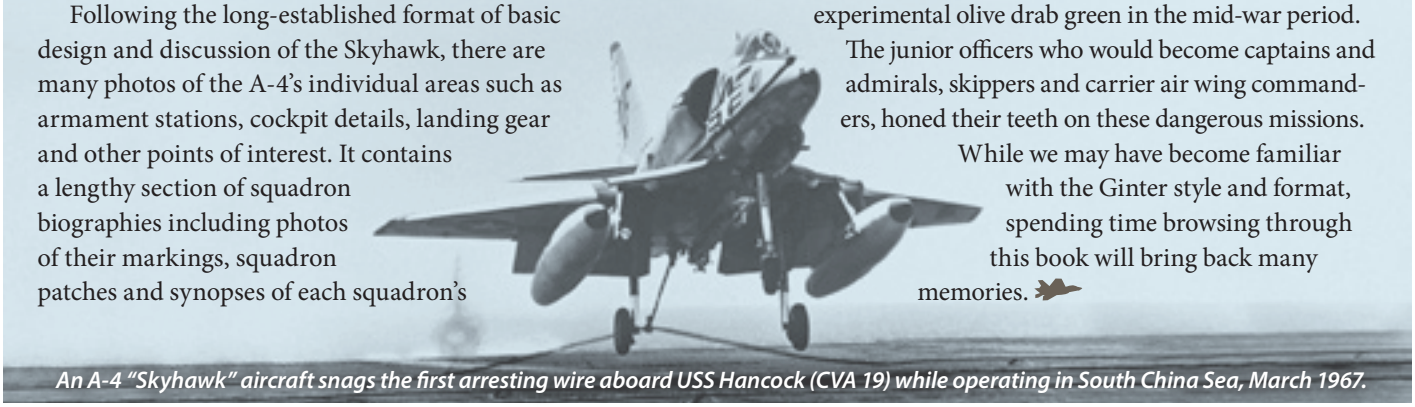
By Steve Ginter, Ginter Books, Simi Valley, CA, 2019

Here is the 109th book under the Ginter Books publishing house series covering the history of military aircraft, "Douglas A-4C/L Skyhawk in Navy Service" is the sixth covering the various models of the McDonnell-Douglas Skyhawk. This long-awaited volume chronicles the A-4 Charlie that so many of our service members flew in Vietnam. One more book in the Skyhawk series remains, regarding A-4Cs in Marine Corps service, which the author-publisher assures will be coming at a future date.

Following the long-established format of basic design and discussion of the Skyhawk, there are many photos of the A-4's individual areas such as armament stations, cockpit details, landing gear and other points of interest. It contains a lengthy section of squadron biographies including photos of their markings, squadron patches and synopses of each squadron's service. These squadron capsules include fleet and reserve squadrons that flew the A-4L, an upgrade of the A-4C that flew many Vietnam sorties. Besides a nice collection of photos, there is the traditional discussion of scale model kits of the A-4C/L.

The A-4C bore the brunt of the first years of Rolling Thunder, flying daily alpha strikes against targets in South Vietnam and North Vietnam, and shouldering a major portion of losses of aircraft and their pilots, who quickly filled the enemy prisons. While certainly a few squadrons flew the A-4B and the A-4E, it was the Charlies and their pilots that took the war to the North Vietnamese and faced the growing assemblies of anti-aircraft guns and SAMs, not to mention the early appearances of MiGs over Hanoi, Haiphong and other enemy cities.

The Charlies flew from every Navy flight deck, large and small, and for a time were clad in some of the most colorful markings of the period. A few of them even sported the experimental olive drab green in the mid-war period. The junior officers who would become captains and admirals, skippers and carrier air wing commanders, honed their teeth on these dangerous missions. While we may have become familiar with the Ginter style and format, spending time browsing through this book will bring back many memories.



An A-4 "Skyhawk" aircraft snags the first arresting wire aboard USS Hancock (CVA 19) while operating in South China Sea, March 1967.

Photo by Chief Journalist R.D. Moeser, USN, courtesy of the Naval History and Heritage Command

STRIKE TEST NEWS

SPECIAL SECTION: AIR TEST & EVALUATION SQUADRON (VX) 23

U.S. Navy photo by Erik Hildebrandt

In this special section, we share the outstanding work the "Salty Dogs" of Air Test and Evaluation Squadron (VX) 23 have performed during 2019 to ensure those of you at the pointy end of the spear have the most capable aircraft, systems and weapons.

The Navy and Marine Corps' largest flight test squadron, VX-23's mission is to execute research, development, test and evaluation of fixed-wing tactical manned and unmanned aircraft. Our test aircraft inventory consists of nine different type/model/series aircraft including F-35 Lightning IIs, F/A-18 Legacy and Super Hornets, E/A-18 Growlers and T-45 Goshawks.

The Navy is looking for fleet input. If you are interested in influencing the future of Naval Aviation, consider joining our developmental test and evaluation team and reach out to me, the Chief Test Pilot, or one of our project officers. Lead the fleet!

–Cmdr. Johannes "Job" Jolly, Commanding Officer VX-23

F/A-18 & T-45 DEPARTMENT

By Cmdr. Daniel "Butters" Radocaj

The VX-23 F/A-18 Department is at the leading edge of testing to ensure the F/A-18E/F remains the Navy's most lethal weapons system into the coming decades.

We are committed to providing the warfighter capabilities to put warheads on foreheads, in both the air-to-ground (A/G) and air-to-air (A/A) arenas.

On any given day, our flight line has a variety of weapons being tested. We have been working tirelessly to qualify Long Range Anti-Ship Missile (LRASM) on the E/F and get that Early Operational Capability to the fleet this year.

Small Diameter Bomb II (SDB II) qualification continues as we ensure that tactically relevant loads can be carried on Multiple Carriage Smart Bomb Racks (BRU-55s). In addition to expanding the E/F's air-to-air loadout and allow carriage on the EA-18G, three AIM-9X Block II missiles were fired from stations 2 and 10. Later this year, we will evaluate weapon separation on the AGM-84D Harpoon.

Personally, I am most excited about the conformal fuel tanks (CFT) we tested this year on Salty Dog 125. The additional fuel capacity will allow us to bring the fight further downrange to our enemies. This was the Navy's first look at how the Rhino's

Salty Dog 122 releases LRASM during flight test.

U.S. Navy photo by Erik Hildebrandt

up-and-away and powered-approach modes were affected, collecting valuable data to allow the CFT design to be finalized before production begins.

The basic F/A-18 cockpit displays have changed little since their introduction in 1978, but today testing is underway on the advanced crew system (ACS) large area display (LAD).

Testing of the components of the Block III Super Hornet is coming together nicely. Mission systems testing has also continued on software configuration set H16, H16 Interoperability and infrared search and track (ISRT) Block AV6+ fleet release.

We are looking forward to the new mission systems software upgrades, which could be capable of momentous A/G capability improvements as H12 did for A/A capabilities, but are currently in its infancy stage of development.

On the safety front, this summer we started minimum controllable airspeed testing (Vmc) to ensure the Rhino can safely recover single engine with a degraded flight control system.

Testing on physiological episodes (PEs) continues on two fronts—the aircraft and the pilot. We are conducting a root cause analysis on the environment control system (ECS) of a Legacy Hornet to understand and characterize the ECS operation and how to properly troubleshoot and repair this system. We are also testing a variety of biosensors to monitor a plethora of medical data points from pilots and presenting this to them in a useful manner as well as providing warnings before a PE occurs.

Our T-45 fleet has also been busy doing a lot of testing.

An increase in the flight idle of the T-45 to give the On Board Oxygen Generating System (OBOGS) more pressure at idle required us to verify the entire airstart envelope. First we practiced a ton of simulated flameout approaches (SFO) which are precautionary approaches (PA) on steroids. They are flown much faster and steeper than an ordinary PA.

During the test program, our pilots logged more than 20 minutes of glider time in the T-45.

If shutting down your only engine, gliding for a while and then performing a restart or squeezing the trigger on an AIM-9X, or pushing select jettison on a rack of the Navy's newest ordnance is on your bucket list, you should apply to the U.S. Naval Test Pilot School and head over to VX-23.

Every day presents us with new flight test challenges and our schedule is packed for the next decade. We could sure use your help.

U.S. Navy photo by Adam Skoczylas

Test pilot Lt. Jonathan "Cyclic" Larsen gears up for a flight test in July.

Prototype Conformal Fuel Tanks

Salty Dog 125 performs conformal fuel tanks handling qualities test.

U.S. Navy photo

By Lt. Cmdr. Mike "Smoogle" Mabrey

The "Salty Dogs" this year took an early look at how conformal fuel tanks (CFTs) impact F/A-18E/F Super Hornet flying qualities.

CFTs are one component of the F/A-18E/F Block III and EA-18G Block II modernization program that will keep the community relevant in the high-end fight against fourth- and fifth-generation adversaries. CFTs are designed to increase the combat radius of the Super Hornet/Growler by providing additional fuel with a smaller drag penalty than external fuel tanks.

The VX-23/Boeing team bolted prototype CFTs onto an F/A-18F to investigate two areas of concern: loss of lift at high angle-of-attack (AOA) with the gear and flaps down and decreased directional stability in mid-range AOA in the clean configuration.

The team found that the aircraft handled like a non-CFT Super Hornet up through 16 degrees AOA in the landing configuration. During clean configuration tests at mid-range AOA, the aircraft appeared to have some roll-off, which could make precise lift vector control more challenging while performing basic fighter maneuvers (BFMs). The program will look to improve how the aircraft handles in this regime through current control law updates.

Production CFT and Block III Super Hornet testing ramps up in 2021 with a full battery of aeromechanical flight tests to clear the aircraft for the entire Super Hornet and Growler envelope.

Aspiring testers now applying to the U.S. Naval Test Pilot School will get a chance to take the jet to the edge of the aircraft envelope and see how the jet handles in BFM and carrier approaches.

I encourage you to apply. We need great people to represent the fleet and ensure Block III Supers and Block II Growlers provide us the same great handling qualities we currently love at the merge.

Infrared Search and Track

By Lt. T.C. "Brick" Barth

Infrared Search and Track (IRST) is an external fuel tank mounted Infrared (IR) sensor that provides passive airborne target detection and tracking for the F/A-18.

The passive IR sensor is designed to provide long-range target detection, tracking and first weapons employment opportunities against advanced airborne threats.

The latest iteration of IRST, AV6+, is light years beyond its Block I predecessor.

Years of testing and improvement have given way to a highly integrated sensor that melds with Super Hornet on-board combat systems for improved ease of operation, reducing operator workload and enabling aircrew to maintain timeline awareness and take advantage of weapons employment opportunities. Advanced detection algorithms and multi-source integration (MSI) blending now provide weapons employment opportunities that would otherwise be unavailable without the aid of the IR sensor.

In March, IRST was released to Carrier Air Wing (CVW) 17 in support of the "speed to the fleet" initiative. With a hard-charging IRST test team, and a highly motivated, forward-leaning air wing, IRST was successfully implemented into the Strike Fighter Squadron (VFA) 94 and VFA-22 arsenals. This early release of IRST AV6+ along with an updated version of the Super Hornet's operating system, H14 System Configuration Set (SCS), was intended to get advanced capabilities into the hands of the operator to increase both lethality and survivability while operating against advanced threats.

The early fleet release was also intended as a means to provide invaluable feedback on maintenance practices, aircrew-sensor interface and tactical employment while developing IRST Block II. The end result will be an even better sensor when IRST hits the fleet with H16 SCS in the early 2020s.

IRST Block II began initial F/A-18 flight test earlier this year and is well on its way to becoming the game-changer it is being groomed to be.

U.S. Navy photo by Erik Hildebrandt

VX-23 conducts flight testing of the IRST external fuel tank mounted sensor.

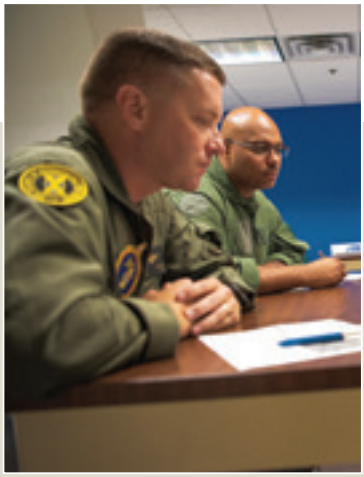
F/A-18 Physiological Episode Testing Update

By Lt. Cmdr. Tristan "Geppetto" Brandenburg

Preventing physiological episodes (PEs) continues to be the top Naval Aviation safety priority.

U.S. Navy photo by Liz Wolter

Salty Dog 205, one of VX-23's T-45 Goshawks, conducts flight testing at NAS Patuxent River, Md.



U.S. Navy photo by Adam Skoczylas

VX-23 test pilot, Lt. Col. Eric "Elroy" Northram, and flight test engineer, Herbie Mann, (in background) participate in a preflight briefing.

VX-23 is involved in multiple efforts to help determine the cause and corrective action to both cabin pressurization issues as well as On Board Oxygen Generating System (OBOGS) issues.

To investigate cabin pressurization issues, a Legacy Hornet has been devoted entirely to Environmental Control System (ECS) testing. This aircraft has been extensively modified to instrument valve positions, flow rates, flow temperatures, pressures and other important parameters throughout the entire ECS. This information did not exist before for the Legacy Hornet.

The modifications took nearly a year to complete and the aircraft returned to flight in June 2019.

The cabin pressure regulator and cabin safety valve have been instrumented with laser-proximity sensors to allow data to be collected, which will show when each valve is open. As the only designed exit points for cabin air, the positions of these valves have never been monitored and may provide insight into the causes of some types of cabin pressure fluctuations.

Lessons learned from other tests using this aircraft are expected to provide new diagnostic techniques and improved maintenance procedures to fleet maintainers and will be used to close branches of the Root Cause Corrective Action (RCCA) for PEs.

To monitor cabin pressurization, a new Cabin Pressurization and OBOGS Monitoring System (CPOMS) flew in June 2019. While data points are still being captured, functionality has been demonstrated. The CPOMS will replace the existing cabin pressure altimeter and will be programmed with the cabin pressurization schedule, providing aircrew a CABIN caution if cabin pressurization is off schedule or fluctuating beyond NATOPS limits.

The CPOMS will also record and save cabin pressurization and OBOGS data to aid in maintenance efforts and will eventually replace Slam Sticks.

On the OBOGS side of the RCCA, the PE test team has been using VigilOx, an instrumented mask, which records the partial pressure of oxygen, flow rates, humidity, mask cavity pressure and other parameters.

Data collected from VigilOx has led to a few theories regarding what may contribute to PEs. On one flight, mask cavity pressure indicated a leaky mask seal, which was undetectable by the aircrew. VigilOx also recorded a corresponding drop in oxygen concentration. Although this event did not result in hypoxia, it does demonstrate the importance of properly fitting flight gear.

VigilOx will be used to help investigate other breathing gas theories including reduced lung volume due to a poorly fitted restraint harness and/or high-g maneuvers. Spirometry, or lung volume measurements, will be taken before, during and after flight to evaluate the effects.

Finally, the team is investigating various types of physiological monitors.

The intent of these is to provide an accurate, real-time assessment to aircrew as to their current physiological state without causing aircrew discomfort. These types of physiological monitors could potentially warn aircrew they are becoming hypoxic prior to cognitive impairment.

The primary parameter many of these physiological monitors seek to measure is blood oxygen concentration, which requires light to be shone through skin. Under g, oxygen rich blood pools in the extremities, so a blood oxygen monitor mounted on the finger or wrist may not provide the necessary accuracy under flight conditions. Sensors mounted closer to the brain provide more accurate and useful data.

The challenge of developing a sensor with acceptable accuracy that can be worn without discomfort is not an easy one, but many unique approaches have been taken and VX-23 is testing them.

Automatic Ground Collision Avoidance System

By Maj. Joshua "Rombo" Moore

Work continued this year on the design and implementation of an automated system for preventing controlled flight into terrain (CFIT) mishaps in the F/A-18A-D.

Risk reduction efforts over the past year included assessing two collision prevention algorithms as the basis for the Automatic Ground Collision Avoidance System (Auto-GCAS).

The currently installed Terrain Awareness Warning System (TAWS) was compared to the F-16's Auto-GCAS system, and after evaluating an updated version of the TAWS algorithm, it was chosen as the CFIT prevention algorithm for the Auto-GCAS system.

Further refinement of the TAWS algorithm occurred, and along with initial simulation of the flight control logic, the Auto-GCAS system was evaluated in a high-fidelity simulator.

The Auto-GCAS system will also include a Pilot Activated Recovery System (PARS), which will allow the aircrew to manually initiate an automatic recovery to straight and level flight.

Further simulator testing is planned to refine the flight control logic, and in-aircraft risk reduction testing is expected to start in spring 2019. The goal of the program is to provide F/A-18 aircrew with a nuisance-free system that saves both aircraft and lives.

U.S. Navy photo by Liz Wolter

Salty Dog 400 conducts APKWS flight test.

KC-46A Centerline Drogue System Qualification and Certification

By Lt. Chad "Nature Boy" Henderson

VX-23 has been working diligently with Boeing and the Air Force to help develop the future of the Air Force's tanking fleet, the KC-46A Pegasus.

The Air Force asked VX-23 to come onboard at the beginning of the program to assist in developing and testing the hose and drogue functionalities of the KC-46A Centerline Drogue System (CDS) and Wing Aerial Refueling Pods (WARPs).

Within the past year, the team has conducted Air Force/Boeing CDS specification testing leading to software upgrades and ultimately a qualified KC-46A centerline drogue system.

With a qualified system established, the team continued to certify the F/A-18A-D throughout the entire CDS envelope. These accomplishments directly aided in the completion of KC-46A Phase II testing, which allowed the Air Force to begin accepting KC-46A aircraft in January 2019 and begin initial operational test evaluations.

VX-23 will be detaching this year to Edwards Air Force Base, California, to execute KC-46A WARPs qualification testing, F/A-18A-D WARPs certification and F/A-18E-G CDS/WARPs certification. The team will be evaluating everything from KC-46A hose reel response, hose marking visibility and lighting effectiveness, to F/A-18 refueling probe loads, receiver handling qualities and aerial refueling performance/compatibility to the edges of the envelope.

An F/A-18 makes initial contact with a KC-46 Pegasus during flight test and evaluation.

Photo courtesy of Boeing/Paul Weatherman

U.S. Navy photo by Liz Wolter

Salty Dog 213 prepares for TC-7 catapult launch at NAS Patuxent River.

CARRIER SUITABILITY DEPARTMENT

By Lt. Cmdr. David "Launchpad" Hurst

Fiscal 2018 was another busy year for VX-23's Carrier Suitability (CVS) Department and 2019 promises more of the same. The CVS department is tasked with ensuring that new aircraft systems are compatible with the carrier environment.

In fiscal 2019, we are traveling to seven of the nation's 10 aircraft carriers and four LHA/LHDs for precision approach landing system (PALS) certifications. These certifications ensure that the precision approach landing systems, such as the Automatic Carrier Landing System (ACLS), Instrument Carrier Landing System (ICLS) and Optical Landing System (OLS) are functioning properly. So far, we have been to USS Theodore Roosevelt (CVN 71), USS Dwight D. Eisenhower (CVN 69), USS Harry S. Truman (CVN 75), USS Ronald Reagan (CVN 76) and USS Nimitz (CVN 68). PALS certifications are probably the most visible aspect of what we do in Carrier Suitability.

In the next few pages, we'll update you on our progress.

After logging nearly 1,000 hours at Naval Air Warfare Center Aircraft Division (NAWCAD) in Lakehurst, New Jersey, Lt. Matthew "Bambi" Dickens has become an expert on the Mk-15 Advanced Arresting Gear (AAG) and will thrill you with a discussion of its capabilities.

Lt. Richard "VcLovin" Tiberio talks about our "Shake, Rattle and Roll" testing at the Mk-7 arresting gear and TC-7 catapult at NAS Patuxent River, Maryland.

Do not hesitate to reach out if you are an aspiring test pilot and want to learn more about Carrier Suitability. Call us to find out when we're going to be shaking at the Mk-7 and TC-7—we're always happy to give tours of the site and have landing safety officers (LSOs) from the fleet observe from the shack. It's one thing to see a picture of a high-sink or off-center test point, but pictures don't really do them justice.

U.S. Navy photo

Salty Dog 100 catches the wire at the Runway Arrested Landing Site at Joint Base McGuire-Dix-Lakehurst in New Jersey, while testing the Navy's Advanced Arresting Gear program.

Advanced Arresting Gear

By Lt. Matthew "Bambi" Dickens

In December 2018, VX-23 completed recovery envelope expansion with Advanced Arresting Gear (AAG) at the land-based Runway Arrested Landing Site (RALS) at Joint Base McGuire-Dix-Lakehurst in New Jersey. Over a four-month span, VX-23 accomplished 254 F/A-18E/F Super Hornet and EA-18G Growler arrestments.

U.S. Navy photo by Adam Skoczylas

Lt. T.C. "Brick" Barth prepares for flight test aboard Salty Dog 122.

The data collected is being used to develop the F/A-18E/F and E/A-18G expanded Aircraft Recovery Bulletins (ARBs) for Ford-class aircraft carriers and is scheduled for release in September. The ARBs will permit fixed-wing aircraft compatibility testing (ACT) next year aboard USS Gerald R. Ford (CVN 78) using instrumented VX-23 aircraft. Upon ACT completion, the fleet can proceed with expanded F/A-18E/F and EA-18G recovery envelope operations.

In just five days following the first T-45C Goshawk AAG arrestment at RALS in April, 60 successful nominal arrestments were completed, initiating the start of full performance testing at the site. Testing is currently underway and will lead to a T-45C ARB by the end of the calendar year, which will support VX-23 T-45C flight operations during CVN 78's ACT and subsequent training command carrier qualifications later next year.

The last major aircraft event with AAG is high cycle testing (HCT) scheduled for later this year at RALS. During HCT, the system will endure 28 aircraft arrestments in 21 minutes using one wire to validate thermal requirements. These short recovery intervals mimic those seen during cyclic operations using three wires at sea.

Shake, Rattle and Roll Testing

By Lt. Richard "VcLovin" Tibereo

What's that?!?

You're wondering if your _\AR_ damaged the weapons you were carrying?

Carrier Suitability (CVS) has been busy with Shake, Rattle and Roll (SRR) testing ensuring that all your stores can withstand all of your heinous powered approach control augmentation system (PA CAS) landings.

SRR evaluates aircraft and weapons systems' durability in a series of catapults and off-nominal arrestments. CVS accomplishes this with a variety of off-axis catapult shots and flying max sink (_\AR_), off center engagements (_LUR_), or inducing yaw/roll during the arrestment.

Over the past year, focus has been on certification of the Long Range Anti-Ship Missile (LRASM) (AGM-158C) for the carrier environment. The program has operated in stages beginning with two loads flights, verifying the 2,450-pound behemoth won't damage the aircraft or aircraft stores during the come-aboard. The second phase of testing included another two full shake flights, incorporating internal systems of the weapon and ensuring no damage to internal parts.

CVS has also completed SRR for the new FMU-139 D/B electronic bomb tail fuze, which will enable additional weapon flexibility through cockpit programmability of the fuze and better hard-target penetration properties. Although fuze technology has come a long way in the past 20 years, make sure to stay tight on the max time-of-fall for an FMU-139 B/B, as it's still likely to come up in your Level 3 checkride!

Looking forward to the latter stages of 2019, CVS is anxious to complete SRR for the Small Diameter Bomb (SDB) and the F414 engine compressor discharge pressure anti-ice valve (acronym TBD, so stay tuned).

CVS will also be characterizing strain on the Super Hornet airframe (flex modes) by conducting both catapults and arrested landings in various configurations in a specially instrumented aircraft. This research will provide validation data for the service life assessment programs in hopes of extending the service life of the Super Hornet.

U.S. Navy photo by Liz Wolter

Salty Dog 120 conducts in-flight engagement during shake, rattle and roll testing at the MK-7 Arresting Gear at NAS Patuxent River. (Yes, this was intentional.)

Two VX-23 EA-18Gs taxi prior to flight test.

U.S. Navy photo by Erik Hildebrandt

AIRBORNE ELECTRONIC ATTACK DEPARTMENT

By Lt. Sean "Crush" Delaney

The last year of Growler flight test brought new and improved capabilities to the electronic attack community and 2019 testing is in full swing as "speed to the fleet" initiatives press the conventional ways of acquisition in the fleet.

For example, the handoff of H14 Developmental Test (DT) to Operational Test (OT) in September 2018 was quickly followed by initial software releases to select fleet squadrons in early 2019.

The Tactical Offensive Radio Operations (TORO) Special Capabilities Pod (SCP) offers a unique hardware infrastructure capability itself, allowing new technologies to quickly be integrated with the Growler in a plug-and-play fashion to rapidly counter new threats. H16 System Configuration Set (the aircraft's mission computer operating system) and Next Generation Jammer testing continue to ramp up while the combined test efforts with Johns Hopkins University Applied Physics Lab and Jammer Technique Organization (JATO) continue, and planning is underway for H18 and other future capabilities.

Collaboration with fleet squadrons, Electronic Attack Weapons School (EAWS), Airborne Electronic Attack Weapon School (HAVOC) and Commander, Electronic Attack Wing Pacific (CVWP) greatly enhance our effectiveness as testers. Coordination with those entities will continue to be a key component in future test efforts.

As with the rest of the Salty Dogs of VX-23, the AEA team is here to support the fleet. Reach out to us with any specific questions related to EA-18G testing. Additionally, the Salty Dogs are always looking for a few good men and women to join the team, so reach out if you are interested in the test world!

EA-18G H16 System Configuration Set

By Lt. James "TwoTimes" Licata and Lt. Alan "Beezel" Helm

In 2019, the Growler H16 test program is in the full throws of test and evaluation! A departure from the last several System Configuration Set (SCS) releases, which were primarily software-centric, H16 includes major hardware upgrades for the Growler.

With a targeted fleet release of 2021, H16 will be the first SCS to interface with the ALQ-249 Next Generation Jammer (NGJ). H16 will also enhance our networked warfighting portfolio via Tactical Targeting Network Technology (TTNT) datalink capabilities coupled with Time Difference of Arrival (TDOA) Block II architecture.

TTNT represents the first integration of a modern datalink network into the Growler. Compared to Link 16, it has faster data transfer rates, larger system throughput and improved electronic protection. TTNT will not replace Link 16, but will instead augment it. In the future, TTNT will be fielded in the Super Hornet and other fleet assets to support new applications like Common Tactical Picture (CTP).

As part of the AEA systems enhancements (ASE) effort, the ALQ-218 will receive its first major hardware overhaul since Growler Initial Operating Capability in 2009, with new weapon replaceable assemblies (WRAs) designed to improve detection, identification and geo-location performance against modern systems in dense radio frequency (RF) environments. The main components for the ASE package arrived at VX-23 in March 2019.

Salty Dog 521 and Salty Dog 531 have completed the majority of their mods to full-fledged H16 Growlers. By year's end, there will be five Growlers at VX-23 conducting H16 flight test.

As the capabilities of H16 continue to develop, be on the lookout for Design Advisory Group (DAG) simulator events where fleet aircrew and testers can jointly weigh-in on crew vehicle interface decisions for this and future Growler upgrades.

U.S. Navy photo by Liz Wolter

Salty Dog 521, conducts NGJ risk reduction test flight.

Tactical Offensive Radio Operations Pod

By Lt. James "TwoTimes" Licata

Tactical Offensive Radio Operations (TORO) is a special capabilities pod developed by the Air Force Research Laboratory for advanced electronic surveillance and attack.

U.S. Navy photo by Liz Wolter

Salt Dog 523 conducts flight test aboard USS George Washington (CVN 73).

VX-23 performed aircraft fit checks on the first TORO pod in late summer 2018. Electromagnetic environmental effects and mission systems testing is planned for late fiscal 2019 in the small anechoic chamber.

A "speed to the fleet" initiative, the goal for this program is to rapidly test and field an Early Operational Capability to the Electronic Attack Wing by the end of the year. The TORO pod has the potential to significantly enhance future Growler mission effectiveness, as the physical pod itself will ultimately serve as a flight-cleared trade space in which to house future advanced payloads not yet in existence and give the fleet a dynamic edge in countering rapidly changing threats.

Low Band Transmitter Vertically Polarized Antenna

By Lt. Jonathon "Zoloft" Parry and Lt. Jonathan "Brawny" Williams

With the recent success of the expeditious testing and release of the AN/ALQ-99 transmitter improvement, known as the BATWING, to the fleet and the aging inventory of vertically polarized (VPOL) antennas causing readiness concerns, VX-23's AEA department has been tasked to test a brand new VPOL transmitter to increase reliability and bring new capabilities to the warfighter.

U.S. Navy photo by Liz Wolter

Salty Dog 521 flies "ridiculous" ALQ-99 loadout.

The current operational flight program and VPOL transmitters were tested at VX-23 during initial certification and the data was used for regression baseline measurements. Currently, the test planning process is nearing completion and the transmitter arrived at Pax River July 18 and began testing July 22. Capabilities Based Test and Evaluation will be the structure within which test efforts are focused, with inputs being provided by current fleet aircrew on employment strategies.

A speed-to-the-fleet mentality will require a focus of test efforts on critical areas required to safely clear the new transmitter and verify the new design serves the current and future needs of the fleet while still delivering this new capability in a tactically relevant timeframe. The VPOL transmitter will be crucial to ensuring the EA-18G can perform current and future missions with an increased reliability over the older transmitters.

ALQ-249 Next Generation Jammer Mid-Band

By Cmdr. Erica "NOTY" Adkins and Lt. Jonathon "Zoloft" Parry

Last year was busy for the ALQ-249 Next Generation Jammer Mid-Band Integrated Test Team (NGJ-MB ITT) and 2019 has proven to be even more so!

U.S. Navy photo by Liz Wolter

Salty Dog 521 recovers to NAS Patuxent River after flight testing.

The NGJ-MB will augment and ultimately replace the EA-18G Growler's legacy AN/ALQ-99 Tactical Jamming System, which currently serves as DoD's primary airborne electronic attack (AEA) system. NGJ-MB's use of software-based digital architecture and high power active electronically scanned arrays is designed to provide the fleet with game-changing increase in capabilities against emerging threats in a diverse and rapidly expanding electronic warfare battlefield.

The NGJ-MB ITT developed and coordinated a joint mission systems test plan with VX-23 and VX-31, serving as an example for joint efforts between the Naval Air Warfare Center Aircraft and Weapons Divisions (NAWCAD/WD) for future high priority weapon systems. This test plan supports Initial Operational Capability date of September 2022. The ITT completed approximately 32 flight hours and 525 anechoic chamber hours as part of risk reduction testing. The flights used the Broadband Emitter Antenna Measurement System, also known as BEAMS, at NAS Patuxent River, and AEGIS Destroyers to develop the most efficient profiles to measure the effective isotropic radiated power beam steering accuracy and evaluate the NGJ-MB airborne.

The first NGJ-MB pod is scheduled to arrive summer 2019. Anechoic chamber testing will commence when the second pod arrives late fall. Prior to the first pod arrival, aircrew and operators received operator training from the manufacturers.

Capabilities Based Test and Evaluation will be at the forefront of the testing effort to ensure rapid fielding that will greatly enhance the warfighter's capabilities and ensure the Navy maintains spectrum dominance for decades.

Air Vehicle Test Plan development is currently underway and will increase as the first instrumented Aeromechanical pods arrive at NAWCAD early 2020 after undergoing instrumentation calibration. The team anticipates an Initial Flight Clearance February 2020 and first flight spring 2020.

Throughout this entire process, feedback from Airborne Electronic Attack Weapon School and the fleet has, and will continue to be, crucial to ensure warfighter readiness to employ the new capabilities and redefine the electronic battlefield for the future when the capability deploys to the fleet in 2022.

U.S. Navy photo by Adam Skoczylas

Lt. Sean "Crush" Delaney returns to NAS Patuxent River after conducting flight tests aboard Salty Dog 122.

MQ-25A STINGRAY DEPARTMENT

Carrier-Based Unmanned Aerial Refueling System Update

By Cmdr. Colin "Bob" Allen

The MQ-25A Stingray Carrier-Based Unmanned Aerial Refueling System, managed by the Unmanned Carrier Aviation Program Office, will be the Navy's first UAV to operate from an aircraft carrier.

Photo courtesy of Boeing

The MQ-25A Stingray will soon begin flight testing at MidAmerica St. Louis Airport, a small regional airport next to Scott Air Force Base in rural Illinois.

It is designed to take off from a carrier, handle mission and recovery tanking for multiple air plan events and execute maritime intelligence surveillance and reconnaissance (ISR). It will enhance the warfighting capability of the air wing by extending the range of all carrier aircraft capable of inflight refueling, a dedicated capability that has been missing from the air wing since the retirement of the S-3 Viking.

The fleet introduction of MQ-25A, currently planned for 2024, will be an historic step toward widespread carrier-based unmanned aircraft capabilities for the Navy.

Last year, the MQ-25 Integrated Test Team (ITT) conducted the first test of the Unmanned Carrier Aircraft (UCA) Mission Control Station (UMCS) in a laboratory at Naval Air Station Patuxent River, Maryland.

Unlike previous unmanned systems, the Navy is developing the ground station for MQ-25A itself, which will enable the Navy to rapidly develop the UMCS independent from the contractor developing the aircraft.

The MQ-25 will be controlled by a single air vehicle operator (AVO) requiring an excellent UMCS human-machine interface to reduce AVO workload. This is a significant challenge that requires aircrew input to develop properly.

The second round of UMCS testing is planned for late fiscal year 2019 where the control station will be connected to Space and Naval Warfare Systems Command labs around the country to test the UMCS interaction with the networks necessary to control the MQ-25A wherever it may operate.

While UMCS development and testing continues, the air vehicle design and development is also underway.

In August 2018, Boeing won the contract to develop and build four MQ-25A air vehicles for the Engineering and Manufacturing Development phase. To accelerate the process, Boeing built a prototype MQ-25 with its own capital funds prior to contract award. That prototype, called T1, is scheduled for first flight this year.

The T1 flight test program will enable significant lessons to be learned early enough in the MQ-25 development to be incorporated into the final MQ-25A design.

The first MQ-25 air vehicles are scheduled for delivery to Air Test and Evaluation Squadron (VX) 23 starting in late 2021 to support an aggressive three-year test program to enable a 2024 Initial Operating Capability.

Testing will include carrier suitability testing at NAS Patuxent River, Naval Air Warfare Center Aircraft Division Lakehurst and multiple trips to a carrier outfitted with an Unmanned Air Warfare Center.

All aspects of MQ-25A testing will require a cadre of carrier-experienced United States Naval Test Pilot School graduates to identify deficiencies and ensure the Stingray is capable of performing the missions it was designed to accomplish.

This is an incredibly exciting opportunity to have a meaningful impact on the future of Naval Aviation.

Squadron Spotlight

Helicopter Maritime Strike Squadron (HSM) 37 "Easyriders"

Established: July 3, 1975

Based: Marine Corps Base Hawaii Kaneohe, Hawaii

Commanding Officer: Cmdr. Gabriel M. Kelly

Mission(s): ***To provide combat ready detachments anywhere and anytime to meet the mission needs of U.S. Pacific Fleet and win the next war at sea.***

Brief History: Helicopter Anti-Submarine Squadron (Light) (HSL) 37 was established in 1975 aboard Naval Air Station Barbers Point, Hawaii. On Feb. 6, 1992, HSL-37 became the first Navy helicopter squadron to transition from the SH-F2 Seasprite (LAMPS MK I) to the SH-60B Seahawk (LAMPS MK III). The Base Realignment and Closure Act relocated HSL-37 to Oahu on Marine Corps Base Hawaii in February 1999. HSL-37 operated as a composite LAMPS MK I/III Squadron until Oct. 1, 1993, at which time it completed the transition to the SH-60B. In February 2014, 22 years after the Easyriders began flying the SH-60B, HSL-37 transitioned to an HSM and began replacing the legacy SH-60B with MH-60R aircraft. The Easyriders operated as a composite squadron until completing the transition in May 2015.

Since its establishment, HSM-37 has deployed combat-ready detachments around the globe. As the only HSM in the middle Pacific (MIDPAC) region, HSM-37 provides a variety of helicopter services to MIDPAC-based ships, including the detachments that embark for deployment. These detachments support all Pearl Harbor-based Arleigh Burke-class destroyers and Ticonderoga-class cruisers located throughout the Western Pacific and Indian Oceans. Homeguard support includes, but is not limited to, operations such as Combat System Sea Qualification Trials, undersea warfare weapons qualifications, and the training of shipboard landing signal enlisted personnel.

The MH-60R primary missions include surface warfare, anti-submarine warfare, electronic warfare, command and control and non-combat operations. Secondary missions include amphibious warfare, air warfare, health services, fleet support operations, intelligence operations, logistics and naval special warfare.

Aircraft Assigned: MH-60R Seahawk

Number of People in Unit: 63 officers and 246 enlisted personnel

Significant Accomplishments:

- Two Meritorious Unit Commendations
- U.S. Coast Guard Meritorious Unit Commendations
- Nine Battle "E" awards
- 126,000 Class "A" mishap-free flight hours in August 2018
- Four CNO Aviation Safety awards
- Navy League Adm. Vern Clark Safety Award
- Commander, Naval Air Forces Blue "M" Medical Award in 2015, 2017
- Two Helicopter Maritime Strike Wing Pacific Golden Wrench Awards for Maintenance Excellence and seven Top Torpedo awards
- 12 Arnold J. Isbell trophies for AS and ASW Excellence
- Five Retention Excellence Awards

U.S. Navy photo

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Aviation Boatswain's Mate (Handling) 3rd Class Marricco Roberts, CVN-70

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